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A COST-BENEFIT ANALYSIS OF NAVY STATION SEARCH AND RESCUE (SAR) LOCATED IN KEY WEST, FL, AND WHIDBEY ISLAND, WA

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THESIS

A COST-BENEFIT ANALYSIS OF NAVY STATION SEARCH AND RESCUE (SAR) LOCATED IN KEY WEST, FL, AND WHIDBEY ISLAND, WA

by

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June 2019

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LIST OF ACRONYMS AND ABBREVIATIONS

AD	Aviation Machinist Mate
AE	Aviation Electricians Mate
AFM	aviation fleet maintenance
AFRCC	Air Force Rescue Coordination Center
AM	Aviation Structural Mechanic
AOR	area of responsibility
AT	Aviation Electronics Technician
AVDLR	aviation depot level repairable
AWS	Navy Aircrewman
AZ	Aviation Maintenance Administrationmen
BAH	basic allowance for housing
BUMED	Bureau of Medicine and Surgery
CAN	Center for Naval Analyses
CAS	contract air service
CBA	Cost-Benefit Analysis
CFT	contract field team
CGAS	Coast Guard Air Station
CNAP	Commander Naval Air Forces Pacific
COA	course of action
COLA	cost of living allowance
DoD	Department of Defense
EMT	emergency medical technician
FAA	Federal Aviation Administration
FY	fiscal year
GS	government specialist
HAZREP	hazard report
LS	Logistics Specialist
MOA	military operations airspace
NAS	naval air station
NAVAIR	Naval Air Systems Command

NHOH	Naval Hospital Oak Harbor
NPS	Naval Postgraduate School
OIC	Officer in Charge
OMB	Office of Management and Budget
OPNAV	Office of the Chief of Naval Operations
OPSO	Operations Officer
PR	Aircrew Survival Equipmentman (Parachute Rigger)
SAR	search and rescue
TIS	time in service
USN	United States Navy
VAQ	electronic attack squadron
VSL	value of statistical life

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I. INTRODUCTION

The United States Navy (USN) currently has six operational search and rescue (SAR) stations that utilize the MH-60S helicopter for their operations. Leadership projects that the demand of these aircraft will increase with the expansion of naval platforms. Without proper compensation to this rising mandate, the Navy may experience a shortage of aircraft by the year 2020. As such, the Navy is examining alternate cost-effective ways to fulfill all operational requirements. To this end, our team surveyed two of the six SAR stations: Naval Air Station Whidbey Island, WA, and Naval Air Station Key West, FL. Our sponsor (N9 – Warfare Systems) specifically selected these stations, as they are the most diverse in terms of terrain, operations, and climate.

Our team conducted a cost-benefit analysis (CBA) on each of these stations' SAR in order to provide the best possible recommendations. In this study, we systematically walked through each of the nine CBA steps, assigning monetary values to all relevant impacts identified. An effective and thorough analysis incorporates every relevant factor available. As such, our team visited both of these sites, meeting with the current staff, leaders, and aircrew. Our objective was to collect current and historical data to better understand the status quo and make educated predictions from selected alternative courses of action (COA).

We analyzed three alternative COAs against the status quo. Each COA was incremental in its development from the status quo (full military personnel SAR units) to full contract civilian SAR services. The first COA researched replacing the current active duty military maintenance team with a contracted team to perform all aircraft upkeep. The second COA added to the first by considering the purchase of a commercial aircraft with the same or better capabilities as the current MH-60, while also outsourcing the maintenance team. The third and final includes what a full contract option would cost. This would encompass all SAR activities from maintenance to personnel to aircraft.

Further, we performed a sensitivity analysis to account for the assumptions and uncertainty included in some of the estimates of costs and benefits. In a CBA, this portion

provides a scope for risk analysis to better qualify the recommendations and potential future fallout of any decision made. While monetary values are important in making the best cost effective recommendation, some factors, such as community relations, proficiency of a civilian team, and aircraft capabilities, while more difficult to monetize, have to also be taken into consideration. During the sensitivity analysis, we also examined the value of a statistical life and compared it to the loss of personnel due to the change from active duty SAR stations to contract operated stations.

After comparing the three different COAs against the status quo, our results captured potential benefits and trade-offs of the COAs considered. Our analysis shows what additional costs must be incurred should military leadership determine that one COA is preferable, or under what circumstances a particular COA may be more beneficial than another. As there are always a myriad of scenarios that accompany any large-scale decision, we feel we presented enough data and background information to capture a majority of potential feasible scenarios that may fall outside the scope of these three specific COAs. The product of our analysis is a thorough investigation of these potential trade-offs, presented in a CBA model that is easily adjustable to any new, updated data or considerations in decision-making.

II. BACKGROUND

A. SAR AND MILITARY MANPOWER/PERSONNEL POLICY

Specially trained pilots and flight crews use the MH-60S helicopter (pictured in Figure 1) to perform SAR missions out of select United States naval air stations (NAS). Increased Naval up-tempo has led to a higher demand on these specific aircraft, which are utilized for Mine Countermeasures, Mission Package deployments, and onboard Littoral Combat Ships. Naval Aviation Command estimates that the demand will exceed the Navy's current supply of the MH-60S by the early 2020s (Naval Postgraduate School & Warfare Systems, 2018). Naval Aviation has been examining all its programs to support the Chief of Naval Operation's guidance to "increase efficiencies through the reduction of aircraft type model series while simultaneously taking advantage of new training technologies and simulation capabilities" (US Navy, 2018). Partially due to a large deficit in the federal budget, Naval Aviation has been one of many organizations ordered to reevaluate their structure of operations and spending procedures.

In this thesis, we conducted an in-depth CBA of the search and rescue missions located at Naval Air Stations Whidbey Island, WA, and Key West, FL. Our aim was to determine if it would be more efficient to maintain the status quo and increase the quantity of aircraft available to the Navy's fleet of ships, or to seek alternative methods of conducting SAR, to include outsourcing its current SAR mission to private contractors.

Although our topic more heavily regarded the logistical strain on MH-60 helicopters, manpower became a significant factor in deciding how to implement the use and mission capabilities of this aircraft. Changes to the SAR mission would affect those personnel assigned to MH-60 squadrons, the SAR units themselves, how the Navy trains these individuals, and personnel and aircraft affected by SAR support. In many cases, current aircrews and personnel assigned to the SAR squadrons at each of the respective NAS' also perform other collateral base-wide duties. If the SAR mission were to be outsourced, there would be some impact on the naval bases themselves with regard to their manning. Personnel resources would need to be reallocated and billets redistributed to

accommodate these personnel requirements and changes. These considerations are certainly germane to manpower and personnel systems analysis.

Figure 1. MH-60 Search and Rescue Helicopter Stationed at NAS Whidbey Island.

The threat of operational changes to MH-60 mission sets is due to the government's directed increase for naval vessels and development of a more lethal U.S. force with stronger offensive capabilities (Larter, 2017). This surge in the number of ships would require personnel to fill them, as well as the helicopters required to accompany the frigates, destroyers, and cruiser vessels that would be built to meet these mandates (Naval Postgraduate School & Warfare Systems, 2018).

B. RESEARCH QUESTIONS

Our research questions are as follows:

1. Primary Question:

What are the feasible alternatives to deliver the SAR capability at NAS Whidbey Island and NAS Key West, given the pressures on fleet tactical aircraft?

2. Secondary Questions:

Could outsourcing station SAR services yield cost savings? If so, what are the intended and unintended effects on manpower and aircraft distribution in both the short and longer run?

What is a more cost-effective alternative for delivering Station SAR capability at each naval air station (Naval Postgraduate School & Warfare Systems, 2018)?

C. WHAT IS SAR AT NAS?

The United States government drafted the National Search and Rescue Plan of the United States with the primary purposes of defining national policy regarding SAR, coordinating civil and government resources, and outlining international commitments. SAR is defined as providing monitoring, initial medical assistance, and/or evacuation of personnel in distress utilizing "public and private resources to include cooperating aircraft, vessels, and other craft and installations" (U.S. Government, 2007). For the purposes of our research, we only examined policies that concern domestic requirements.

By direction of the National SAR Plan, all DoD facilities are required to provide their own resources for SAR. They are not to be dependent upon civil, commercial, or Coast Guard resources to cover their military operations. Regarding land-based government facilities, the Air Force Rescue Coordination Center (AFRCC) at Tyndall Air Force Base manages the SAR program for the continental U.S. The Coast Guard (pictured in Figure 2) oversees SAR for Hawaii and all other U.S. maritime territory. In other instances, such as a national disaster or emergency as affirmed by Presidential Declaration, DoD receives orders from Homeland Security.

Figure 2. U.S. Coast Guard MH-60T Conducting SAR off the Coast of Tampa Bay, FL. Photo Courtesy of Coast Guard Key West (U.S. Coast Guard, 2016).

It is important to understand the relationship between these entities and how they are applied to domestic SAR operations to comprehend how SAR is conducted at the NAS level. In the event of an emergency involving military operations, on-base units have authority for immediate response to care for their own units. When an incident involving civilians occurs, civilian SAR has first response priority as managed by the state Emergency Management Division. When a civilian or commercial unit is unavailable to support and desires assistance from a military unit, the Emergency Management must submit a request to AFRCC. AFRCC will then determine the viability of the request and issue orders to the local military unit for approval or any further guidance (Buchholz, 2009). Although AFRCC oversees all military domestic SAR, DoD assets are required to provide assistance to civil authorities to the maximum extent possible, so long as said assistance does not interfere with the necessities of military operations (Michele A. Flournoy, Under Secretary of Defense for Policy, 2011). This cooperation ensures good

faith between the United States Government and the civilians it swears to defend and protect.

There are six total Navy SAR units throughout the continental United States. A standard Navy SAR unit is comprised of two or three MH-60S helicopters with active duty pilots and crewmembers to operate and fly them. Staffing of maintenance personnel varies across the individual NAS's. Maintenance teams are comprised of one of three variations: full active duty military personnel, hybrid of military and civilians, or full contract services. Employment of SAR is also dependent on the station's geographic location. Not all SAR units conduct themselves in the same manner. Each station is dependent upon many factors concerning types of missions and training flights conducted as normal operations of the local base. Other considerations vital to each location include terrain, seasonality, natural disaster tendencies, climate, international boarders, availability of additional assets, and local political considerations.

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III. LITERATURE REVIEW

A. COST ANALYSIS FOR A DEDICATED SEARCH AND RESCUE CAPABILITY FOR COMMANDER STRIKE FIGHTER WING U.S. PACIFIC FLEET

In March 2009, LT Russell Biros completed a comparative analysis at Naval Postgraduate School (NPS) regarding SAR on the West Coast (Biros, Corpus, Hines, & Riggs, 2009). His personal experiences conducting flight operations and concerns over SAR capabilities became the capstone project for his master's education. Biros specifically tailored his research towards arguing the merits of a dedicated SAR unit that could improve support for NAS Lemoore. Due to substantial airspace congestion in years prior, Lemoore had significantly increased their military operations airspace (MOA), both over land and sea. The expanded airspace region increased the burden placed upon the SAR units as they now covered a much broader territory. To complicate conditions at Lemoore, federal budget cuts in 2004 had disbanded the SAR unit at NAS Lemoore altogether. Over the ensuing five years, pilots would be required to train and operate at greater distances away from home base without the support of a rapid-response SAR unit. Biros aimed to identify the most cost-effective method to reestablish the SAR unit.

When the SAR support at Lemoore had ceased, a Center for Naval Analyses (CNA) research paper had deemed that the Coast Guard Air Station in San Francisco (CGAS) would be able to manage SAR in support of Lemoore flight operations. Biros provides evidence and alternate sources highlighting that these previous findings were inaccurate. CGAS was often overwhelmed with its own local workload, leaving Lemoore to seek assistance from additional locations such as San Diego, Fallon, China Lake, and Edwards Air Force Base. Each of these locations were located several flight-hours away, or often entrenched with covering their own area of responsibility (AOR). Response times to Lemoore aircraft mishaps significantly increased and jeopardized the ability to save lives or adequately locate downed aircraft. As the CNA study had concluded that CGAS could support Lemoore AOR they were required to first contact CGAS in the event that a mishap or downed aircraft occurred. If CGAS was otherwise occupied, Lemoore than relayed

requests for support to these other units, requiring Lemoore to simply wait for a favorable response and available unit. Considering the relatively slow speed and average two-hour flight time of a typical military helicopter, most units required two or three hours of transit to Lemoore MOAs and a stop to refuel prior to engaging in SAR missions. Over water, these delays and considerations worsened.

Biros' preliminary results concluded that SAR needed to be restored immediately. He provided five COAs to reinstate SAR coverage for NAS Lemoore. His analysis observed an overview of flight, maintenance, and operating costs to helicopter SAR units at NAS Whidbey Island, NAS Fallon, and NAWS China Lake. In addition, he provided data from contracts previously negotiated where SAR was outsourced to civilian pilots and organizations. Biros constructed his COAs using the cost data provided and a baseline of 240 average annual flight hours required by policy for currency and proficiency. Operating costs for each unit and COA were averaged down to per-flight-hour expenses, and then compared against one another over the 240 hours. His five COAs were as follows: establish a replicate SAR unit to mirror one of the three afore-mentioned air stations – making up three of the proposed COAs, create a detachment from an existing SAR to support NAS Lemoore, or hire a third party contract agency to conduct SAR for NAS Lemoore. Aside from providing numerical cost data, Biros also provided a simple list of pros and cons to each of the five options.

In his capstone project, Biros ultimately concludes that the best option for NAS Lemoore was for the Department of Defense (DoD) to negotiate a contract and outsource the SAR mission. This endorsement was largely made as contracts could be more easily and swiftly implemented as a consequence of Lemoore having no SAR unit on the base. A contract service could be a temporary fix "should the Navy decide to pursue an organic military SAR solution" (Biros et al., 2009). Manpower would be provided by the agency that wins the contract, and terms could be renegotiated at each contract renewal date. In contrast, the cost to the DoD to pay for military personnel was not negotiable and manning could not be as easily reassigned from other AORs to establish a new unit.

The scope of Biros' study was limited to the operational costs associated with flying the aircraft and considerations of quality of life for the personnel assigned to SAR units.

His study also did not include cost analyses for the procurement of new or contracted aircraft and limited his study to only 240 annual flight hours per fiscal year. We augmented and updated the data from the 2009 Biros' study by gathering our own data from NAS Whidbey Island, NAS Key West, and additional sources. Our study provides insight into the procurement of potentially new or differing aircraft to the MH-60. We also found that squadrons were flying much more than 240 hours per year and will cover more of this data in our results.

B. COST-BENEFIT ANALYSIS OF MARINE CORPS SEARCH AND RESCUE (SAR): A STUDY OF ALTERNATIVES FOR MARINE CORPS AIR STATIONS AT CHERRY POINT AND YUMA

In December 2013, thesis authors, Major Clinton Collins and Major Robert Williamson, conducted a CBA of the Marine Corps SAR stations in Cherry Point, NC and Yuma, AZ. The two SAR stations they analyzed were the last of their kind amongst all Marine Corps stations; three Marine SAR units were shut down just prior to their study. Collins and Williamson looked into whether a commercial contract for SAR services at each of the two bases would be more cost effective than keeping the current status quo. This question is similar to what we evaluated with NAS Whidbey Island, WA, and NAS Key West, FL. Their analysis was more of a Cost-Benefit analysis, like ours, but the benefit factor was left out of the end result (Collins & Williamson, 2013). They did not scrutinize or examine additional factors such as benefits or indirect impacts of Marine and contract SAR services.

From their paper, we understood that finding the commercial outsourcing data would be the biggest obstacle in conducting such an analysis, so we immediately reached out to as many point of contacts as possible to ensure this would not be the case for us. These contracting companies retained this information in order to maintain their competitive advantage in the market. After reaching out to five different contacts, we were able to obtain a credible fully contracted quote. Like Majors Collins and Williamson, we compiled data directly from the Navy's current Aviation Plan and our onsite visits. Their publication looked at the status quo and used historical data compiled from the previous 10 years. According to their data, the military support missions were very few and over 50

percent of total missions flown were for civilian assistance (Collins & Williamson, 2013). We found obtaining 10 years of historical data challenging from both of our sites. While NAS Whidbey Island, WA, had thorough records dating back 10 years, content within the records were inconsistent and too difficult to mirror over the full time period. NAS Key West, FL, was only able to provide SAR missions from the past two and a half years.

During our research, we learned that each SAR team is so unique that a single policy decision does not mirror across all bases and locations. Outsourcing the SAR mission was not an all or nothing option, as each of the remaining stations were looked at individually for their capabilities and how they would go about maintaining the current readiness state. Collins and Williamson analyzed the frequency of military and civilian SAR missions conducted throughout the years, breaking down the information into pie charts, such as those observed in Figure 3.

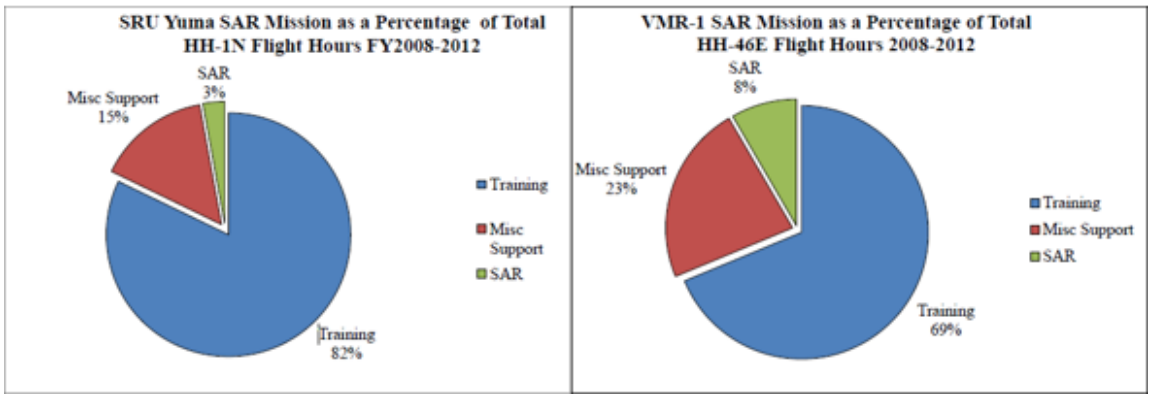

Figure 3. Frequency of Military and Civilian SAR Missions. Source: Collins and Williamson (2013).

Figure 4. Bell HH-1N Huey out of Marine Corp Air Station Yuma in Arizona. Photo courtesy of Collins and Williamson (2013).

For the Marine Corps SAR mission, the aircraft being utilized were the HH-1Y (Figure 4), which were prematurely being replaced despite the presumption of a 30-year life cycle. We were not facing the same issue, as we needed to find the answer to a dwindling MH-60 fleet due to growing operational commitments. Unlike the HH-1Y scenario, we were looking for aircraft platforms that were already outfitted for the SAR mission. Comparable to the model that Collins and Williamson created, we broke down our costs into categories for the status quo and each of our courses of action. They broke down their annual costs into the following five categories: level of manpower, unit level operations, maintenance and support, sustainment and support, and continuing system improvements. As we began to gather information, we found that we would need to break down our costs into six or seven categories. To forecast the operational and support costs, they used double exponential smoothing, but we used the consumer price index and historical data to ensure we achieved the best possible estimates.

In the end, Majors Collins and Williamson recommend that the Marine Corps consider outsourcing the SAR mission to commercial contracts, estimating a $14 million

per year savings to the DoD. Though their direct finance numbers indicate that a full SAR option becomes the most cost-efficient to the government, we hope to look at the indirect factors that would be affected in such a decision.

C. FURTHER RESEARCH AND WHAT WE HOPED TO OBTAIN

In our analysis, we aimed to capture and scrutinize supplementary elements specific to each NAS location that would provide us a more comprehensive look at all parameters that involve SAR. Some of the factors investigated include:

1. Hours flown for defense related emergencies or SAR
2. Responses to other emergencies – civilian or commercial entities
3. Potential collateral duties held by SAR commands and how this affects base manpower
4. Terrain considerations and the effect on SAR
5. Aircraft capabilities
6. Training requirements of pilots and crew members
7. Identify stakeholders
8. Additional costs and benefits to the larger Navy readiness and at the smaller base/squadron levels

Ideally, we wanted to know any and all requirements placed upon the flight crews that were additional to their assigned mission to prevent fallout. Our sponsor and subordinate entities provided us with a significant amount of data. We examined this information, as well as requested additional material during our site visits to both NAS Key West and NAS Whidbey Island. Some of the data required for our analysis included total flight time of SAR units, total hours flown on SAR missions, additional duties undertaken by SAR units, etc. Based upon a study conducted by the Center for Naval Analysis' (Hoeft, Espinoza, Cade, DoD N8, personal communication, March 18, 2019), the Office of the Chief of Naval Operations (OPNAV) predicted that the MH-60S will be depleted for SAR

use by fiscal year (FY) 2025. The OPNAV long-term recommendation was to use a contract air service (CAS) to provide all SAR services.

One major strength to our research was that many services and programs had previously conducted studies regarding SAR missions. Naval research in 1998 concluded that the market competition between commercial and government SAR capabilities was non-existent. Since SAR is not considered to be an inherently or exclusive commercial activity, the government would likely gain very little by outsourcing to commercial assets (Brodin, 1998). In 2013, the British government conducted an analysis on transferring all military domestic SAR to commercial companies. Sparked by an aging military aircraft and desire for the British Government to increase its frontline defense roles, the announcement of such a move sparked controversy amongst local populations. Tens of thousands of citizens signed petitions to maintain a status quo that had served both its civilians and military expertly for over 70 years. The newer aircraft was reported as being unable to match the same capabilities of the current aircraft, and commercial aviators would be unable to match the same capabilities and levels of risk of highly trained military personnel (Morris & Carrell, 2013). In 2013, the British Government announced that Bristow Helicopters Limited would exclusively oversee all search and rescue operations for the domestic UK (Bristow Group, n.d.).

There are many entities which conduct search and rescue operations: including, county sheriff and fire rescue services, the National Parks and Forestry SAR, and the remaining branches of military service. In order to identify what capabilities and limitations already existed among standing commercial units, we sought to coordinate with some of the afore named entities. We referenced their historical data to add depth to our knowledge and level of analysis. In our CBA, we had the opportunity to consider the experiences and lessons learned from previous studies on SAR operations.

Some of the obstacles identified in our work regarded factors which were difficult to measure. For one example, both NAS Whidbey Island and NAS Key West are located off the coast. As our analysis and limited time availability narrowed us to just two locations, it was not possible to accurately compare our findings to the other naval air stations that are positioned inland, such as Fallon, NV, or China Lake, CA. Another consideration was

the quality of life and potential implications a lack of SAR may have on helicopter communities. Currently, SAR is an assignment that offers respite from the normal operational or deployment demand. This assignment is appealing to individuals or their families who may desire a temporary change of lifestyle in military service. Additionally, service in a SAR command does not often promote well amongst the officer pilot ranks. We did not obtain adequate resources to determine how service in SAR units affects enlisted promotion rates. Therefore, we were unable to adequately evaluate how changes to SAR would affect individuals' quality of life nor what implications or changes to SAR might have on the Navy helicopter community at large. Some of these challenges, and other specifics, were covered in Chapter IV to lay out how we established our CBA model.

IV. METHODOLOGY

A. IS A CBA THE "RIGHT WAY" TO ANALYZE A POLICY CHANGE?

The aim of our thesis was to conduct a CBA to analyze the Navy's domestic SAR mission. A CBA is an analytical approach to solving a resource allocation problem or making a decision as it pertains to society as a whole. The CBA approach highlights the trade-offs that exist in each COA considered when compared to the status quo. It attempts to consider all factors relevant to a particular change in the status quo and attempts to measure the impacts of various courses of action. As was the case with our analysis, a CBA makes every effort to estimate monetary values for each component of a COA in an attempt to determine which outcome best fits the desired objective.

> There are nine steps to a CBA:
>
> 1. Decide whose benefits and costs count (standing).
> 2. Select the portfolio of alternative projects.
> 3. Catalogue potential (physical) impacts and select measured indicators.
> 4. Predict quantitative impacts over the life of the project.
> 5. Monetize (attach dollar values to) all inputs.
> 6. Discount for time and find present values.
> 7. Sum: Add up the benefits and costs.
> 8. Perform sensitivity Analysis.
> 9. Recommend the alternative with the largest net social benefit.
>
> (Boardman, Greenberg, Vining, & Weimer, 1996)

It is rare to find a single, clear solution to a complex problem. Instead, there may be multiple plausible options to pursue, each one with its unique advantages and disadvantages. This is what makes a CBA the ideal method of analysis. It systematically evaluates the relative strangths and weaknesses of each COA considered against the status quo. As we examined the feasibility of the Navy's current SAR program at the two NAS' considered in this thesis, there are a myriad of actions which can be taken. In the interest of time, we were only able to examine a select few COAs in this thesis. A CBA provides a system of analysis and projection of costs and benefits over time. This system enables related analyses to be conducted in any of the following four CBA formats:

1) *Ex ante* CBA – conducted prior to the intervention. Useful to show whether resources should be used on a program or project.
2) *Ex post* CBA – conducted at the end of the intervention. Provides information about the particular class of intervention.
3) *In medias res* CBA- conducted during the intervention.
4) Comparative CBA – compares the ex ante predictions to ex post results for the same project (very few of these comparisons have been conducted because the clients of ex post analyses are different from the clients of ex ante analyses).

(Boardman, Greenberg, Vining, & Weimer, 2006)

B. CBA BREAKDOWN FOR NAVY SAR

Step 1: Who Has Standing?

We assumed that the entities with standing in this analysis are the DoD, more specifically the Unites States Navy, its personnel, and potential commercial sources for aircraft and services.

Step 2: Portfolio and Alternatives

Status Quo – Navy SAR is flown by active duty navy pilots and enlisted aircrew members. The current aircraft flown for such missions is the MH-60S. Other factors such as maintenance and support staffing are specific to each individual SAR location.

Evaluation – We examined three COAs against the status quo:

a. COA 1 - Active duty SAR aircrew with a maintenance contract field team (CFT).

b. COA 2 - Active duty SAR aircrew, CFT maintenance, estimated cost to replace MH-60 with new aircraft.

c. COA 3 - Removal of active duty military SAR support and convert to full contracted SAR services.

Project Life – We have set our project timeline for our analysis to be five years. This is also the time increment previously communicated to us by our topic sponsor, conveying that the MH-60 will potentially remain in service for a couple more years. This means that changes to Navy SAR may come as soon as the early 2020s. From the date of

policy implementation, our study measures the latent effects of this policy change against our assumptions and is valid over the subsequent five years.

Timing and Format – Since the policy change has not yet been decided nor implemented, we will take an Ex ante look into the topic. The military does anticipate implementing a policy to change SAR operations (Naval Postgraduate School & Warfare Systems, 2018). We observed whether the benefits outweighed the costs for each COA considered.

Step 3: Identify Impact Categories

The main impact categories considered are listed below as way of examples.

Direct Marginal Benefits

1) If a contract service is chosen, this would result in lower turnover rates and decreased loss of working knowledge of AOR and operations.

2) Efficiencies of operations may increase with seasoned personnel filling the billets for longer periods of time.

Indirect Marginal Benefits

1) Long-term effects could show that the Navy saves some money on personnel costs if contracting is considered, as the Navy would not have to pay BAH, retirement, or additional benefits to contractors that are otherwise provided to active duty service members.

2) A contracted service could improve civil-military relations as the government is providing employment to the general public.

Direct Marginal Costs (Policy Change)

1) The government would endure a contracting cost that would have to cover all aircraft, personnel, maintenance, training and overhead costs for a given contract period.

2) The Navy would incur costs associated with relocating all personnel and property associated with any change in the status quo, and not having the ability to conduct its own SAR operations.

Indirect Marginal Costs (Policy Change)

1) The DoD could incur additional costs associated with performing security clearance background checks should civilian SAR be required to recover downed aircraft with such equipment on board.

2) Should leadership move to a full contract service, the Navy would not be able to take credit for any support operations to assist the local population. This recognition would shift to the contracting company. Public relations are valuable for military bases as it aids their efforts to maintain a positive outlook in the face of a critical public eye.

Direct Costs (Maintain Status Quo)

1) With an impending helicopter shortage, the Navy would be forced to purchase more SAR capable aircrafts to keep SAR stations and newly commissioned platforms fully manned.

2) Additional Sailors would be needed to operate newly acquired aircraft, which would increase recruiting requirements and increase personnel and training costs.

Indirect Costs (Maintain Status Quo)

1) With a mandated increase in aircraft there would, in turn, be an increase in manpower, training, maintenance, and overhead costs associated with additional helicopters.

2) With additional manpower requirements, additional long-term personnel costs such as healthcare, retirement benefits and tuition benefits would be mandated.

Step 4: Predict Impacts

These assumptions and data regarding the impacts over time are presented in the Results (Chapter VI) portion of our thesis.

Step 5: Monetize Impacts

We collected a broad range of data to encompass a large majority of costs associated with conducting Navy SAR. Information includes, but is not limited to, costs to aquire helicopters, personnel to operate aircraft, maintenance personnel, maintenance costs, support personnel, contract negotiations, etc. Each of these costs were compiled together to calculate a cost per aircraft per one hour of flight time.

For the purpose of this CBA we used $9.6M for the value of statistical life (VSL). We derived this value based on background information provided by Boardman (Boardman et al., 2006), as well as from previous federal studies performed both at the Naval Postgraduate School (Rohlfs, Sullivan, & Kniesner, 2015) and through the Department of Transportation. The U.S. Department of Transportation (2016) calculated the VSL to be $9.6M in August 2016. We used the Consumer Price Index (Bureau of Labor Statistics, n.d.), accounting for inflation, to calculate what the VSL would be in October of 2018. This date was chosen in order to match the contractor data from our sponsor, which was also calculated for 2018 pricing.

Step 6: Discount Rate

According to the U.S. Government, federal proposals such as these provide benefits to the service members, who operate under the umbrella of the U.S. Government. Therefore, these impacts should be calculated as "'internal benefits', which take the form of increased Federal revenues or decreased Federal costs." Therefore, these would be most appropriately calculated at the 1.3 (Department of Defense, 2018) percent real interest rate. There is also a portion of this project which yields external social benefits. These external benefits include the contract with aircraft manufacturers or maintenance teams. Since they are civilian organizations that provide benefits of industry and commerce to the public, they are not considered "internal" to the U.S. Government. As such and per the OMB Circular A-94: "External social benefits and their associated investment costs should be discounted at the 7 percent real rate" (Department of Defense, 1992).

Step 7: Add Benefits and Costs

This data is presented in the Results (Chapter VI) portion of our thesis.

Step 8: Sensitivity Analysis

As discussed previously, each COA can be varied infinitely. Our COAs were provided under stipulation of various assumptions we made. These assumptions will be clearly laid out as they pertain to each SAR station (Key West and Whidbey). Sensitivity Analysis allowed us to explore the viability of our assumptions in each COA, and to understand their impacts on the recommendations we made. It also allowed us to vary from the defined COAs to determine if possibilities exist for an alternate or more effective COA.

Step 9: Our Recommendation

This will be provided as part of our conclusion and final analysis Chapter VII.

C. HYPOTHESIS AND INITIAL FINDINGS: WHERE THE ANALYSIS MAY TAKE US

Several U.S. entities have opted for the route of contracted services, while other studies suggest active duty is preferred for military direct support. Through our research we have found different studies suggesting that it may be more economical for the DoD to pay contractors at a lower cost than keeping a full military unit active 24/7. To say that commercial outsourcing is cheaper is difficult to determine initially without all data that encompasses it. With the military aiming to potentially add a new aircraft to future operations, those costs and benefits must also be considered.

Hypothesis: After outlining our two potential COAs, we believe there are cost saving opportunities for the DoD. Solely considering the COAs from a monetary perspective, we hypothesize that CFT services, COA 1, can be the most cost beneficial. While COA 2 and COA 3 would still save the military money, it may only be a fraction of the potential savings of a full SAR contracted team. Through this CBA, we also hope to

analyze the indirect losses of eliminating an active duty SAR unit. We believe that these losses may outweigh the monetary gains.

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V. RELEVANT RESEARCH

In addition to maintaining the current status quo, we have laid out three different COAs for consideration. All assumptions, parameters, and considerations identified in defining the COAs take into account our own constraints of time and resources available to conduct a CBA. In order to develop a comprehensive but realistic model, we considered limits and wanted to convey to our readers how we derived our assumptions and in what way they related to the overall picture and our ultimate conclusion.

A. ADDITIONAL CONSIDERATIONS FOR COAS

In this section, we clarified some of the background information surrounding our COAs, the AORs of the bases we examined, and this study. Topics suggested in this section were meant to highlight some of the key differences between existing civilian and military employment of SAR.

1. Potential Excess MH-60 Aircraft

By not maintaining the status quo, the existing SAR helicopters may become available for utilization amongst the expanding naval fleet platforms. We feel compelled to convey that in our process to research Navy SAR, we noted several sources which claim that the Navy has a significant excess of MH-60Rs (Ziezulewicz, 2019a). One article even claims that the Navy spent billions of dollars to purchase these aircraft, while paying millions more to store them (Trevithick, 2019). One recommendation would be to find a way to utilize the existing aircraft rather than keep them in preservation (Ziezulewicz, 2019b) or pursue procurement of an entirely new line of aircraft. We were unable to spend more time and resources to research this topic further; therefore, we recommend that more research be conducted on this avenue prior to a final decision being made about SAR employment.

2. Aircraft of choice for SAR

For the purposes of our study, we chose to evaluate potential utilization of the Bell 214B with future employment of Navy SAR. There were several reasons we decided upon this assumption, as presented below.

a. Airbus H145 Lakota

In further discussion with our sponsor, one suggestion was to evaluate the procurement of commercial aircraft operated by military crews and supported by either military or contract maintenance (Aaron J. Taylor CDR, OPNAV N98, personal communication, February 15, 2019). In this correspondence, N98 relayed that NAS China Lake and the U.S. Army were using these aircraft and already had an established contract with Airbus that might generate a feasible alternative to SAR. However, we discovered that these aircraft were being purchased at a rate of $7M each, whereas the MH-60 aircraft cost closer to $2.7M (Carey, Michael J., CIV OASN (FM&C), personal communication, March 12, 2019). Based on that factor alone, we decided for this thesis that the cost of the new Airbus would outweigh the benefits of obtaining a comparable and cheaper aircraft.

Additionally, we were unable to determine all the capabilities of the H145 based on the specifications provided by Airbus (Airbus, n.d.). At NAS Key West (Figure 5), the helicopter crews are required to fly with two auxiliary gas tanks. The H145 is limited to a maximum takeoff weight of 8,157 lbs, whereas the MH-60R has a max takeoff weight of 22,500 lbs (Sikorsky, 2006). This leads us to believe that the H145 would be insufficient to meet the requirements dictated within the Key West AOR.

Figure 5. MH-60S – Search and Rescue Aircraft during Training Flight near NAS Key West.

Given that the H145 is currently employed at NAS China Lake, we have no reason to believe that it could not meet altitude requirements at other NAS SAR locations with significant mountainous terrain, such as NAS Lemoore or NAS Whidbey Island. We were also unable to determine the internal capacity of the H145 and if medical and gas tank requirements would allow for its smaller internal spacing capacity as compared to the MH-60 (Patrick Cleary and LT Adam Granic, personal communication February 12, 2019). Given the pricing and unknown factors, we could not make an appropriate determination or evaluation using this aircraft, and therefore did not choose the H145 as a feasible option for future SAR employment for this analysis.

b. Sikorsky S-92

In subsequent correspondence, we were also asked about the potential feasibility of procuring the S-92 for future SAR employment (Hoeft, Espinoza, Cade, DoD N8, personal

communication, March 18, 2019). We concurred that this aircraft's potential 802 NM range and massive payload capacity is impressive ("Sikorsky S-92® helicopter," n.d.). We obtained pricing information for this aircraft. We assumed that the price of this aircraft would be significantly higher than that of the H145 and would also not be a feasible option to the U.S. Government. In order to ensure that our research was thorough, we developed a COA around the procurement of the S-92 to evaluate its potential for SAR employment.

c. Bell 214B

While engaging with N98, we were directed to the PMA-226 shop, which proved to be a very useful data source to our study. In October 2018, NAVAIR conducted a briefing where they presented data for the employment of SAR services under a civilian contract using the Bell 214 (Goucher & Dunlap, 2018). The brief concluded that the Bell approximated the performance capabilities of the MH-60R. Upon further clarification from the PMA-226 shop, we learned that the Bell 214 would be previously purchased and owned by the contractor at the start of the contract (Link, Rhonda CIV USA PMA-226, personal communication, April 13, 2019). The Navy would only be paying a depreciation cost per flight hour flown while under contract. The consideration of these factors made the Bell 214 a clear viable option for SAR services and seamless candidate for the purposes and constraints of our study.

3. MH-60R vs. 60S

Currently, SAR utilizes the 60S. For our research, we used cost estimates for the 60R. When we initiated contact with PMA-226, their research was conducted comparing the Bell 214 with costs against the 60R. Secondly, our sponsor provided us with historical cost information on Navy aircraft. The average cost of the MH-60R over five years was $2.54M, while the MH-60S was $2.30M (see Table 1). We concluded that the cost difference between the two was minimal, and combined with the study from PMA-226, would provide a more accurate comparison with data from the MH-60R for the purposes of our study. Furthermore, we will only refer to these aircraft as MH-60 through the remainder of our analysis.

Table 1. Historical Cost of Aircraft for FY2013-FY2017 without Manpower Costs. Source: Carey, Michael J., CIV OASN (FM&C), personal communication, March 12, 2019

Aircraft Type/ Model/ Series	Fiscal Year	Then Year Dollars	Count	Cost Per Aircraft ($M)
MH-60R	2013	319,855,635	153	2.09
MH-60R	2014	405,168,787	175	2.32
MH-60R	2015	521,998,204	192	2.72
MH-60R	2016	549,814,044	212	2.59
MH-60R	2017	672,712,116	225	2.99
MH-60S	2013	379,770,218	200	1.90
MH-60S	2014	485,661,377	214	2.27
MH-60S	2015	526,678,042	229	2.30
MH-60S	2016	530,907,146	228	2.33
MH-60S	2017	595,793,067	222	2.68

4. CFT and Civilian workforce

If leadership were to make an effort to establish further CFT Maintenance teams, it appears as though the DoD would first have to repeal OMB Circular A-76, which "prohibits DoD Components from converting … any functions and work currently performed, or designated for performance, by any number of civilian personnel to private sector (contract) performance" (Stewart, 2018). Since locations such as Whidbey Island have a maintenance team mixed of civilians and active duty military, it would not be permitted to proceed forward with any type of contracted services as long as this provision is in place.

Our research led us to a navy pilot who formerly initiated SAR at NAS Fallon in 2012. He described that the command ran into many issues regarding overtime and work hour adjustments for civilians due to California state labor laws (K. Teague, personal communication, March 2, 2019). We recommend that further research be conducted to analyze the potential trade-offs that may occur when utilizing civilian workforce versus the full support capabilities of a military force that operates around the clock. Additionally, the PMA-226 study assumes that the contract negotiations would include 24/7 coverage to military operations. For the purposes of our study, we are unable to examine these trade-offs, or scrutinize the various state laws that may have such provisions for civilian labor within the many states encompassing Navy SAR services. It bears noting that such local

and state laws may prohibit the desired functionality of a fully civilian contract SAR workforce.

In a personal interview conducted on January 24, 2019 with Deputy Michael McLeod (Chelan County Sheriff Office), we learned more about the restrictions to civilian SAR support. As the DoD is considering the potential switch to civilian contract SAR, we found his perspective to be very insightful to our research. Deputy McLeod is a regional coordinator for SAR, operating closely with NAS Whidbey Island, neighboring Snohomish County, the U.S. Forest Service, as well as coordinating with other local county and state organizations as needed. During the interview, he highlighted two significant restrictions to their own capabilities: the cable hoist and take-off minimums.

The cable hoist attached to a SAR helicopter only extends to about 200 feet below the helicopter. The Pacific Northwest, particularly in the area where the Navy's F-18s operate, is covered with trees above 300 feet, contains many steep mountainsides, and high altitude peaks. These conditions present some challenges for civilians to conduct SAR services. Either civilian entities must land miles away and hike to the individual(s), sometimes taking hours of valuable time under extreme weather conditions, or they call upon the military for more rapid support. Whidbey SAR uses the same cable hoist; however, they overcome this obstacle by training their aircrew to operate using traditional rock climbing rope and repelling, which can extend several hundred feet further than the cable mechanism. Civilian companies will not permit their personnel to operate with a rope and repelling system as it is considered too high a risk or liability to do so (Deputy McLeod, personal interview, January 24, 2019). We believed that should the DoD wish to pursue a contract SAR service, the generated trade-off is the loss of its ability to rescue its own Navy pilots from such conditions if they cannot find civilians willing to accept the risks of rope repelling.

Also highlighted by Deputy McLeod, take-off minimum requirements become another restriction for civilian pilots. The Federal Aviation Administration (FAA) mandates that pilots do not take off unless weather meets specified requirements (Aviation Supplies and Academics, Inc, 2016, p. 180). Civilian entities associated with SAR in the Pacific Northwest operate using the FAA's visual flight rules (Deputy McLeod, personal

interview, January 24, 2019). Under these provisions, helicopter pilots cannot take off unless they are able to stay at least 500 feet below clouds and prevailing visibility is one statute mile. In such an AOR where weather is poor roughly nine months of the calendar year, weather minimums often do not meet requirements and civilian pilots (or their companies) are unable to accept risks for special consideration due to inclement weather; often relying on the assistance and capabilities of Whidbey SAR. Military pilots accept high levels of risk and are authorized to fly under instrument flight rules as prescribed by the DoD. Under these provisions, Whidbey SAR may take-off and land as long as the cloud layer is above 200 feet and prevailing visibility is at least one-quarter mile (Air Warfare (N98), 2016). Given the background information provided by Deputy McLeod, such considerations to proficiency and capability of the pilots should be considered and weighed should the DoD pursue a civilian SAR contract. Such degradation in capability and skill could prove costly to military personnel stationed at NAS Whidbey Island who rely on the capabilities and consistency of current Whidbey SAR.

5. Base Manning

Should leadership decide to move forward with contracting services, we foresee some potential issues with simply pulling the active duty crews away from the NAS locations as they are actively intertwined with base operations and collateral duties. There would need to be some manpower shifts and billet redistributions to ensure each NAS is manned fully for all functions. For the purposes of our Cost-Benefit Analysis, we were not able to properly monetize, nor analyze the effects of such a policy change against base manning directives.

6. Public Relations

Generous consideration should be given to the conditions of public relations in the Pacific Northwest. The local population surrounding NAS Whidbey Island is noticeably anti-military and very outspoken against base operations in the region. Such public outcry threatens the continued military operations and future stability of NAS Whidbey Island. With great consistency, litigation is mounted against NAS Whidbey Island for threats to public health, public safety, animal rights, and a myriad of other concerns that adversely

affect normal base operations. In an interview with the base Commanding Officer, he stated, “We are not always perceived in a positive light by the public. The good will that SAR provides on a consistent basis to the community is what allows our P-3/8s and VAQ Wing to keep flying.” (CAPT Arny, personal communication, January 17, 2019). One recent example of this goodwill was the rescue of a group of Boy Scouts from Mt. Baker (The Associated Press, 2018). At an altitude of 10,781 feet, civilian SAR entities were unable to assist due to poor weather conditions and lack of an aircraft powerful enough to reach the required altitudes. Events such as these are regular and used by NAS Whidbey Island staff to promote their continued presence and operations in the region. If SAR services were converted to a civilian contract, the Navy would be unable to promote their involvement in these events of public service, as they would become property of the contracting company itself. If SAR were to become potentially degraded by a less capable civilian force, or disappear altogether, then the Navy at large may lose Whidbey Island.

7. Medical and Emergencies

Current medical services at Naval Hospital Oak Harbor (NHOH) have proven to be inadequate for current base operations. In a report prepared by the Electronic Attack Squadron (VAQ) Commander, his findings cited that “Commanding Officers [were forced] to accept undue levels of risk due to the lack of access to timely treatment” (VAQ Wing, 2016). The NHOH Emergency room and urgent care facilities were closed in Oct 2007 and Jan 2014 respectively. With the latest closure, 24/7 services were also lost, leaving personnel to only receive medical treatment during normal daytime business hours. This has meant that overnight watch and maintenance teams did not have medical coverage at the base hospital. Several hazard reports (HAZREPS) within the report highlighted the severity of risk to service members as a result of inadequate care.

In the event of this gap in service, SAR medical has also stepped in to provide this 24/7 care and medical treatment when maintenance injuries occurred after hours. The aforementioned report underlines the Navy’s Bureau of Medicine and Surgery (BUMED) dependency on SAR capability, as there is no emergency room provided on base. Whidbey SAR medical teams are qualified in Advanced Life Support capabilities, while all other

civilian air assets in the region are only eligible to support Basic Life Support measures (Deputy McLeod, personal communication, January 24, 2019.) It is likely that a change to civilian SAR would also require increased manning and capabilities at the on base medical facility. Either the civilian contract EMT's would need to provide this same level of care and be compensated thusly, or N98 would need to have further discussions with BUMED to investigate the viability of bringing an emergency room back to Whidbey Island. In the end, we have assumed that this would cost the Navy more money and we were unable to evaluate those costs fully.

NAS Key West operates under very similar constraints. Their corpsman are assets provided by BUMED. The local military clinic only operates during normal business hours, and local civilian medical facilities are inadequate to support and aircraft emergencies or injuries to active duty personnel. Key West SAR is restricted to base after hours and on weekends during flight operations. In the event that an aircraft emergency occurs, pilots are directed to fly injured personnel directly to facilities in Miami that are properly equipped to treat such personnel. The DoD would need to evaluate whether it would be able to impose such restrictions to base on civilian contract personnel.

Additionally, the PMA-226 study only accounted for two emergency medical technician (EMT) personnel amongst the civilian SAR workforce. It is our estimation that this number is insufficient. The PMA-226 study assumes that there will be two Bell aircraft provided with only two EMT personnel to support. This does not account for the provision of backup EMTs. We recommend that a minimum of four EMT personnel be allocated to meet the demands of a two-aircraft SAR crew. Based upon this recommendation, for our study we calculated the costs for four EMT personnel to be assigned with any SAR contract service.

B. ASSUMPTIONS FOR COAS

In order to obtain the best possible representation of dollar values for our model, assumptions were made based upon our professional knowledge, limited time available, data sources, and related published literature.

1. Active Duty Personnel

All active duty personnel numbers were obtained from each site's funded manning reports. Although some extra personnel were stationed at the NAS due to limited duty or other reasons, they were not factored into the personnel numbers we calculated. Only funded billets were considered. Other assumptions were made with respect to the active duty base pay. Time in service (TIS) is a large factor when determining the monthly salary of an active duty member. We cannot determine definitively how much TIS each billeted member of each rank has nor the potential TIS for future personnel assigned; therefore, we established a mean. Using the FY 18 pay scale, all base pay amounts were derived by taking the average pay at each rank, observing the minimum and maximum allowable TIS for that rank. We duplicated this effort when calculating the cost of living allowances (COLA) for NAS Whidbey Island, WA.

In COAs 1 and 2, maintenance will be contracted out. In order to properly capture the personnel costs to these COAs, manning and maintenance had to be separated to capture accurate costs to both parties. We used the stations' manning documents and eliminated the following maintenance rates: AD, AM, AE and AT. This left us with rates germane and essential to aircrew operations: AWS, LS, PR, AZ and all officers to be calculated in the personnel costs for these COAs. For Whidbey Island, we also had to remove one Lieutenant from the personnel costs as that billet is the maintenance officer and would be encompassed by the proposed CFT maintenance package.

2. Aircraft

For the purpose of this analysis, all costs associated with the different models of aircraft were calculated using the number of flight hours flown at each NAS location.

For NAS Whidbey Island, WA, our team used the hours allotted as reported by their Officer in Charge (OIC) (OIC Whidbey Island SAR, personal communication, May 19, 2019); 960 hours granted for FY19. We presented the breakdown of hours flown in Table 2, observing the historical flight hours flown, as reported in the AFAST system. In FY16, Whidbey SAR reported having flown 861.8 hours. In FY17, they reported 915.9. For FY18 only two quarterly reports were obtained, which did not capture the entire year.

We used an average derived from the quarterly reports acquired, which revealed a three-month average of 248.9, or a potential 995.6 hours flown for FY18. In FY19, Whidbey SAR was on track to fly their full allocation of 960.

Table 2. Whidbey Island SAR – Historical Hours Flown. Adapted from Whidbey SAR, email from OIC, May 17, 2019, and Whidbey SAR, email from Aviation Maintenance Duty Officer, January 16, 2019.

Whidbey Island SAR	
Year	Hours Flown
FY16	861.8
FY17	915.9
FY18	995.6
FY19	967.2

FY18 was based on a reported quarterly average of 248.9

FY19 was based upon reported hours from the previous quarter of 241.8, a projected 967.2 for the year

We followed a similar methodology at NAS Key West, FL, utilizing their AFAST data reports. Below, in Table 3, we show the breakdown of historical hours flown for this site. Key West has shown an increase in flight hours flown over the last few years. In FY16, they flew 611.3 hours, and in FY17, they reported flying 625.8 hours for the year. For FY18, their AFAST data reported them at 747.7 hours. For FY19, Key West reported they were on track to fly 880 hours. In an interview with their Operations Officer (OPSO), we learned that Key West SAR has an approved flight hour allotment of 216 hours per quarter (OPSO Key West SAR, personal communication, February 5, 2019). This equates to 864 hours allotted per FY. We chose to use the allotted hours of 864 to both match our methodology for Whidbey Island and expecting that any contract negotiated would require the civilian teams to fly the same number of hours permitted to the active duty personnel.

Table 3. Key West SAR – Historical Hours Flown. Adapted from Key West SAR, email from OPSO, May 17, 2019, and CWO3 Watkins, email from Key West Maintenance Officer, February 20, 2019.

Key West SAR	
Year	Hours Flown
FY16	611.3
FY17	625.8
FY18	747.7
FY19	880

FY19 was based upon reported hours from the previous quarter of 220, a projected 880 for the year

In order to capture yearly costs of the actual aircraft price, we used the typical lifespan of the MH-60. We found this to be 12,500 hours SLEP'd and 10,000 not SLEP'd (Richard Holocomb, personal correspondence). In simple terms, "SLEP'd" refers to the process of authorization granted to an airframe to extend its useful life. In the case of the MH-60, the Navy authorized the lifespan of this aircraft to be increased by 2,500 hours. Through further discussions, we identified that most naval aircraft are SLEP'd. Knowing this, we used the lifespan hours of 12,500. We then took the fully burdened price (Table 1) of the MH-60 and divided it by the number of SLEP'd hours, 12,500 and multiplied that amount by the number of hours flown by the NAS per year. This provided us with the yearly cost of the aircraft. We mirrored this method for the S-92 in COA 2.

3. Training

When we received data from PMA-226, the contract proposals included estimated costs for training. At the NAS sites, there was no individual calculation for training provided. Active duty aircrew personnel are trained during flight operations; therefore, their training hours were incorporated into the allotted flight hours. Maintenance conducts training during routine maintenance of aircraft; therefore, their costs of training are already

calculated into the maintenance costs. For COA 1 and COA 2, we emulated this thought process, assuming that the training hours would be encompassed in the total flight hours flown and maintenance performed by the individual NAS. These costs were covered throughout the model.

4. Maintenance

Maintenance costs for the status quo were derived from the NAS' AFAST data provided during our site visits. From this data, the aviation depot level repairable (AVDLR) and aviation maintenance fleet (AFM) costs were averaged from the quarterly reports. The AVDLR costs encompass the repairable components requisitions costs and the AFM costs refer to the consumables category of maintenance. We took the totals provided and calculated a quarterly average for each station based upon reports received. Active duty maintenance personnel were not included in this category since all active duty personnel costs were included in our personnel cost category.

We were unable to gather sufficient data to capture real cost to maintenance on the Sikorsky S-92. For the purposes of this analysis, we assumed that maintenance costs would be comparable to the MH-60.

Contract costs for CFT maintenance in COAs 1 and 2 were based off data obtained from NAS Lemoore, CA, and NAS Fallon, NV. After completing site visits to Whidbey Island and Key West, we determined that NAS Lemoore most resembled NAS Whidbey Island and NAS Fallon more closely mirrored NAS Key West. We reached these determinations by evaluating and comparing the size of the base, number of squadrons currently stationed on board the NAS, and level of activity on the base. Therefore, contracting data from Lemoore was applied to Whidbey Island estimates, while Fallon data was referenced for Key West.

5. Facilities

Facility costs were provided to our team by NAS Whidbey Island, which included utilities, facility maintenance and building services. The total cost would sustain the hanger utilized by SAR for the year. Since NAS Key West was unable to provide our team with

facility information, we assumed that the amount calculated by NAS Whidbey Island would be comparable. This assumption was drawn from our site visit, witnessing similar hangars and facility spaces.

6. Active Duty Fully Burdened

In order to capture the full payroll costs of an active duty member, we augmented results from a study conducted by RAND (Dahlman, 2007). This study classifies and includes all in-kind benefits and compensations costs such as healthcare, military housing, commissary, separation pay and retirement pay, as found in Tables 9–11 in the appendices.

VI. RESULTS

A. THE DATA

Our team compiled data from a plethora of different sources. The site visits conducted were the best asset we had in compiling the most accurate data for our analysis. Professional sources from N9, PMA-226, Commander Naval Air Forces Pacific (CNAP), as well as Navy publications were also utilized to break down each of the three COAs and define the status quo. We combined our data with all assumptions and considerations listed in Chapter V to generate the results of the Cost-Benefit analysis we conducted, presented below. Our analysis considered costs only, and it does not monetize any of the possible trade-offs described in the previous chapter. While cost comparisons can be insightful, decision-making should consider the big picture, with costs and resulting trade-offs associated with each COA.

1. Whidbey Island

NAS Whidbey Island, WA, our first site visit, set the standard for data collection. From this command, our team gathered manning documents, AFAST spreadsheets, and facility costs. Located on the banks of the Puget Sound in the state of Washington, NAS Whidbey Island's SAR team endures many difficult terrains, climates, and environmental elements. All of these factors were taken into consideration while developing each of the COAs, and alternative options to the status quo. Proposed options were considered and evaluated as being comparable or superior in order to maintain the current state of readiness. Our team has provided an analysis of each COA considered. A full breakdown of each of these cost values can be found in Table 4.

Table 4. COA Breakdown Whidbey Island

	Status Quo	Costs	COA 1	Costs	COA 2	Costs	COA 3	Costs
Personnel	40-active duty and 14-civilian	$4,518,065	25-Active Duty	$1,933,175	25-Active Duty	$1,933,175	12-contracted aircrew +EMTs	$1,256,320
Aircraft	MH-60R	$234,306	MH-60R	$234,306	S-92	$1,359,360	BELL 214B	$1,035,840
Fuel	JP-5	$297,793	JP-5	$297,793	JP-5	$609,299	JP-5	$475,550
Training							Contracted training for 10	$72,000
Maintenance	Active Duty	$2,863,778	Contracted Labor/ Painting/Materials/ Travel	$4,130,381	Contracted Labor/ Painting/Materials/ Travel	$4,130,381	Contracted Labor/ Materials/Shipping/ Travel	$1,423,760
Facility	Whidbey Island	$77,613	Whidbey Island	$77,613	Whidbey Island	$77,613	Whidbey Island	$77,613
Misc	Active Duty Fully Burdened Costs	$4,335,215	Active Duty Fully Burdened Costs	$2,709,509	Active Duty Fully Burdened Costs	$2,709,509	Insurance/Modernization/SW, Charts, Weather	$174,570
Admin							Program Management/Overhead/ G&A/Profit	$2,031,250
Total		$12,326,769		$9,382,777		$10,819,338		$6,546,903
Preliminary Difference from Status Quo		0		$2,943,992		$1,507,431		$5,779,866

The above table is a comparison of each of the analyzed COAs for NAS Whidbey Island, WA, for the duration of one calendar year. All costs have been calculated based upon base year 2018.

*Preliminary Difference refers to our estimate of the cost difference between the indicated COA and the status quo.

a. Status Quo

Currently NAS Whidbey Island's SAR unit is comprised of 40 active duty personnel and 14 civilian government specialist (GS) employees and contractors. The unit historically operates with two MH-60s for missions with a mixed active duty and civilian maintenance team. Whidbey SAR operates out of a shared hanger with VAQ 209. Our data suggested that the cost to operate the current SAR unit out of Whidbey for a full calendar year is approximately $12.3M.

b. COA 1

For our first COA, we proposed implementing a full CFT maintenance team. This would downsize the number of active duty sailors to 25. This shift in personnel lowered both the personnel costs and active duty fully burdened costs, in addition to lowering the estimated cost for maintenance. The unit would still be comprised of two MH-60s in their shared hanger. This difference in maintenance yields a preliminary difference of $2.9M below the status quo.

c. COA 2

For our second COA, the CFT maintenance remained in place as with the option of COA 1, leaving 25 active duty personnel for air operations. The contrast for COA 2 is the aircraft. We replaced the MH-60 with the civilian Sikorsky S-92 detailed in Chapter V. Although this aircraft would cost more than the MH-60, we believed that with the dwindling inventory of the current platform, this COA would be a viable option to consider. The increase in aircraft cost in COA 2 is compensated by the decrease in costs due to the proposed maintenance contract. This makes the cost of COA 2 less costly than the status quo, and presents a difference of $1.5M.

In consideration of the full feasibility of the S-92, our team found that if the aircraft lifespan could be increased, or further SLEP'd, than this would yield a greater cost differential relative to the status quo. For example, if the aircraft were SLEP'd to 25,000 hours, vice the current threshold of 12,500 for the MH-60, then the estimated cost would decrease from $10.8M to $10.1M per year. This generates a preliminary difference of

$2.2M from the status quo. Therefore, we can conclude that if S-92 projected lifespan can be increased, it would further increase the preliminary cost savings to the USN.

Table 5. COA 2 Addendum with Increased SLEP'd hours

	*COA 2 Addendum	Costs
Personnel	25-Active Duty	$1,933,175
Aircraft	S-92	$679,680
Fuel	JP-5	$609,299
Training		
Maintenance	Contracted Labor/ Painting/Materials/ Travel	$4,130,381
Facility	Whidbey Island	$77,613
Misc	Active Duty Fully Burdened Costs	$2,709,509
Admin		
Total		$10,139,658
Difference from Status		$2,187,111

Aircraft cost is based upon a life span of being SLEP'd to 25,000 hours vice the 12,500 hours used in original COA 2.

Note the slight increase in the preliminary difference from the status quo in Table 4.

d. COA 3

For our third and final COA we considered a full contract for all SAR services. This contract replaced all active duty personnel with 12 contractors to perform as a trained aircrew and required EMTs, augmented by a contracted maintenance service. As a result, all active duty fully burdened costs were eliminated and replaced with contract costs, such as insurance, modernizations, charts, program management, and overhead. In this COA,

the aircraft considered was the Bell 214 B. The full methodology behind this decision was previously outlined and described in Chapter V. Combined with data gathered from PMA-226, we estimated that the cost of employing a contracted service for a period of a full year, or 12 months, yields a preliminary difference in cost of $5.8M.

2. Key West

Our second site visit, NAS Key West, FL, exemplified just how different the individual SAR stations can be. From this command, our team once again gathered manning documents, AFAST spreadsheets, and mission logs. This NAS is located south of mainland Florida and north of Cuba in the Gulf of Mexico. NAS Key West has a vast AOR, which requires aircraft to fly with two auxiliary gas tanks in order to cover their required territory. They also deal with a large tourist population to include cruise ships and many international visitors. These distinct factors were taken into consideration while developing each of the COAs as the alternative options to the status quo. Considered changes were comparable or superior in order to maintain the current state of readiness. A breakdown of each of these costs associated with maintaining this posture is pictured in Table 6.

Table 6. COA Breakdown Key West

	Status Quo	Costs	COA 1	Costs	COA 2	Costs	COA 3	Costs
Personnel	48-Active Duty	$4,038,988	24-Active Duty	$2,250,701	24-Active Duty	$2,250,701	12-contracted aircrew +EMTs	$1,256,320
Aircraft	MH-60R	$210,875	MH-60R	$210,875	S-92	$1,223,424	BELL 214B	$932,256
Fuel	JP-5	$319,058	JP-5	$319,058	JP-5	$364,867	JP-5	$284,774
Training							Contracted training for 10	$72,000
Maintenance	Active Duty	$3,058,980	Contracted Labor/ Painting/Materials/ Travel	$3,288,538	Contracted Labor/ Painting/Materials/ Travel	$3,288,538	Contracted Labor/ Materials/Shipping/ Travel	$1,338,416
Facility	Key West	$77,613	Key West	$77,613	Key West	$77,613	Key West	$77,613
Misc	Active Duty Fully Burdened Costs	$5,202,258	Active Duty Compensation	$2,601,129	Active Duty Compensation	$2,601,129	Insurance/Modernization/ SW, Charts, Weather	$174,570
Admin							Program Management/Overhead/	$2,031,250
Total		$12,907,772		$8,747,914		$9,806,272		$6,167,199
Preliminary Difference from Status Quo		0		$4,159,858		$3,101,500		$6,740,573

The above table is a comparison of each of the analyzed COAs for NAS Key West for the duration of one calendar year. All costs have been calculated based upon base year 2018.

*Preliminary Difference refers to our estimate of the cost difference between the indicated COA and the status quo.

a. Status Quo

Currently NAS Key West's SAR unit is comprised of 48 active duty personnel. The unit has two MH-60s to be utilized for missions with a full active duty staff for maintenance. Based upon the manning, aircraft, and maintenance data collected; it costs roughly $12.9M to run SAR for a 12 month period.

b. COA 1

Our first COA involved the implementation of a full CFT maintenance team, like NAS Whidbey Island. This would downsize the number of active duty sailors to 24, eliminating all maintenance personnel similar to our methods for Whidbey Island. As a result, both personnel and active duty fully burdened costs were reduced, in addition to a lower estimated maintenance cost. The unit would still be comprised of two MH-60 aircraft. This adjustment in personnel is projected to develop a preliminary cost savings of $4.2M when compared with the status quo.

c. COA 2

In the second COA, the full maintenance contract remained in place with the eliminated personnel from COA 1. This, once again, left 24 active duty personnel for air operations. Incorporating the same methodology we used for Whidbey Island, the aircraft is assumed to be replaced by the Sikorsky S-92. Our team believed replacing the MH-60 addressed the soon-to-be over-exerted MH-60 inventory. This determination was detailed in Chapter V. COA 2 would generate a potential increase in aircraft cost; however, it would be compensated by a decrease in maintenance costs due to the proposed CFT plan. This option delivers a potential preliminary cost savings of $3.1M versus the status quo.

As presented in our analysis for Whidbey Island, an increase in SLEP'd hours of the S-92 will decrease annual aircraft costs over the useful life of the platform. This will, in turn, increase the amount of preliminary difference from the status quo, making COA 2 a more viable selection to decrease burden on the MH-60 platform and aircrew community. Values specific to Key West were not calculated; however, the effects would be highly similar to those displayed in Table 5 for Whidbey Island.

d. COA 3

For our third and final COA, a full CFT Maintenance for all SAR services was analyzed. CFT replaced all active duty personnel with 12 contracted personnel to perform as a trained aircrew and required EMTs. As a result, all active duty fully burdened costs were eliminated and replaced with contract costs, such as insurance, modernizations, charts, program management, and overhead. In this COA, the aircraft considered was the Bell 214 B. The full methodology behind this decision was previously outlined and described in Chapter V. Combined with contract data obtained from PMA-226, we estimated that full cost to run a contract SAR team out of Key West would yield an estimated preliminary savings of $6.7M below the status quo costs.

B. SENSITIVITY ANALYSIS

In a Cost-Benefit analysis, the monetary values and bottom-line totals provide guidance in selecting the best decision. While our analysis includes monetized costs, it does not estimate in dollars the benefits, or trade-offs associated with each COA considered. Decision-making should take into account the full picture, with costs and benefits. In this section we will address the potential effects of our proposed COAs, which could help to formulate a larger picture than the cost comparison alone. Every action that can be taken has an effect. Consequently, there are downfalls to relying solely on cost savings to determine the best COA regarding SAR. Of the viable options considered it is important that we are thorough to critically analyze the fallout or trade-offs generated by these potential decisions. A majority of the issues we foresaw at hand were discussed at length in Chapter V. Below, our team highlighted some of potential issues in shifting SAR from the status quo.

An aspect we examined was the repelling and cable restrictions to civilian contracting teams. This constraint does not appear to apply to NAS Key West as our team did not observe a necessity in their AOR for the use of a longer cable system or rope-repelling unit. However, for NAS Whidbey Island, rugged mountainous terrain of the Pacific Northwest and the limitations of cable length add significant potential to increase the loss of life. We have defined the VSL to be $9.6M. For both sites, if we estimate that

the degradation of a civilian SAR unit would risk the life of one added military member per year, then this $9.6M becomes an added cost to the gov't per year. Referring to Table 4 – COA 3, if the DoD were to save $5.8M to employ a civilian contract SAR team at Whidbey Island, but lose one military life at $9.6M, then contract SAR would in turn cost the DoD $3.9M. For NAS Key West (Table 6 – COA 3), this cost to the government would be $2.9M.

Our team also considered the status of medical readiness if active duty SAR was to be removed and replaced. Both Whidbey Island and Key West operate with very limited medical support in the event of aircraft emergencies. SAR corpsman are fully qualified to provide advanced life support as needed, whereas local civilian certifications are inadequate to provide such care. Without a full 24/7 medical facility on site, this brings undue risk to the pilots that operate therein. It had been stated by government entities that civilian units would operate under the full capacity of current active duty SAR units. Observing current capabilities of civilian counterparts within these AORs, we were not confident that civilian SAR units would be able to match current capabilities of active duty SAR personnel. In order to maintain status-quo-level support, the DoD may need to consider options of hiring additional contractors or providing additional training to increase capabilities of civilians hired. Hiring a contract SAR unit could mean higher costs incurred to the government than previously stated in COA 3 due to these outlying factors.

We evaluated the ramifications of pulling active duty SAR out of each location and the effect it might have on community relations. For Whidbey Island, the USN and DoD can benefit from all of the positive press and community attention it can get, since the public does not view the NAS in a positive light. Navy SAR boasts the potential to enrich community relations. If civilian contractors take on this role, the Navy potentially loses the rewards of public praise. NAS Key West does not seem to face these same criticisms from the local public. Being a more remote location they are more removed from such potential public scrutiny. However, due to the high cost of living expenses and remoteness of the base, the civilian contractors may find great difficulty in securing affordable housing within a reasonable driving distance to NAS Key West. Such considerations could potentially

require the DoD to provide a significant increase in contract costs, or provide for civilians to secure local government housing.

VII. CONCLUSION

The United States Navy (USN) currently has six operational search and rescue (SAR) stations that utilize the MH-60 helicopter for their operations. Increasing operational demand is anticipated to stress MH-60 capacity in the early 2020s, when total requirements will exceed the overall aircraft inventory. We surveyed two of the six SAR stations: Naval Air Station Whidbey Island, WA, and Naval Air Station Key West, FL, and conducted a cost-benefit analysis to identify recommendations on how to meet the higher operational demand for the existing MH-60 fleet.

In an effort to best conclude our analysis, our team went back to the initial primary and secondary research questions. Considerations were given to our assumptions, research, and sensitivity analysis; evaluating each research question considered in this thesis.

a. What are the feasible alternatives to deliver the SAR capability at NAS Whidbey Island and NAS Key West, given the pressures on fleet tactical aircraft?

Our first recommendation concerning this question would be to investigate whether the Navy has any excess fleet of MH-60 aircraft, per sources outlined in Chapter V. Using any unused inventory would both relieve pressure on fleet tactical aircraft and provide a cost-saving feasible alternative.

If no excess fleet of MH-60 aircraft is available, we inferred from this question that the Navy's primary goal is to identify an alternative aircraft for SAR. With this in mind, COA 1 becomes an invalid option as it would only apply to SAR maintenance and would not identify the desired relief platform. With an increasing surface fleet and the growing demand for helicopters to embark on these new ships, our team's second and third COAs would generate the desired relief for both NAS Whidbey Island and NAS Key West. As described in COA 2, the MH-60 aircraft would be replaced by the civilian Sikorsky S-92 and cost-savings opportunity with a CFT maintenance team. Although this aircraft would come at a greater monetary cost to the USN, our team found cost savings in COA 2 through a CFT maintenance with a lowered fully burdened cost to personnel. COA 3 becomes the other potential solution to relieve pressures to the fleet tactical aircraft. In this COA, an

alternate aircraft, CFT maintenance, and contracted civilian flight crew would replace the active duty NAS SAR team. However, the trade-offs associated with COA 3 can be significant; such as, limitations to civilian flight capabilities, inability to rope repel from aircraft, loss of overnight medical support from active-duty SAR medical teams, or potential increased loss of life.

b. Could outsourcing station SAR services yield cost savings? If so, what are the intended and unintended effects on manpower and aircraft distribution, in the short, and longer run?

Through our research, we found that outsourcing station services could potentially result in an annual cost savings. Whether it is solely outsourcing the active duty maintenance component with a CFT, or replacing the entire military SAR services, our three COAs each identified potential savings to the DoD.

Manpower could likely be reassigned to alternate squadrons where they may provide relief to commands struggling to meet personnel requirements. In the short run, manning would be affected at both NAS Whidbey Island and NAS Key West. Several individuals with the SAR teams either hold positions with base operations, or are BUMED assets with the local base clinics. Long run changes in manning would require coordination with several DoD entities to ensure proper SAR services and medical support are maintained. Other considerations to manning were previously outlined in Chapter V and our Sensitivity Analysis.

Regarding aircraft in the short run, it would require a major investment to implement the purchase of civilian aircraft, as the S-92s are about $17.7 million each; however, if this shift was done in conjunction with an outsourcing of a maintenance contract, some cost savings would be attained to offset the high initial expense. In the long run, these newly purchased aircraft would answer the question of the aircraft needed to fill the newly emerging platforms, and take the place of the MH-60s in a SAR capacity. As discussed in Chapter VI, there would be some significant drawbacks and other trade-off factors to consider in addition to costs.

c. What is a more cost-effective alternative for delivering Station SAR capability at each Naval Air Station (Naval Postgraduate School & Warfare Systems, 2018)?

Our team visited both of the SAR stations at Whidbey Island and Key West, speaking at length with their staff and crew. Contract maintenance was a prominent theme that would potentially provide both a cost savings and more efficient and capable maintenance team. We found some of the other NAS SARs (NAS Fallon and NAS Lemoore) had already employed this option successfully. We found that contracting maintenance would be a large cost savings to the DoD. For NAS Whidbey Island it could present a cost differential of over $2.9M and a cost differential of $4.1M for NAS Key West. These cost shifts were largely due to the removal of active duty maintenance teams, which eliminated a significant portion of active duty fully burdened costs currently paid by the DoD.

COA 3 was found to have the largest potential cost differential from the status quo, at a difference of about $5.8M for NAS Whidbey Island and about $6.7M for NAS Key West. However, these numbers do not consider other relevant trade-offs highlighted in our sensitivity analysis and relevant research. These potential civilian SAR contracts would need to include clear terms to attain the proper saving margins, generate the needed level of service, and not put the Navy's aircraft personnel at undue levels of risk. This would be more prevalent in the case of NAS Whidbey Island. With their unique terrain and climate, the noted constraints of civilian SAR aircrews would likely pose limitations on the ability to conduct SAR operations to the same standard as the status quo.

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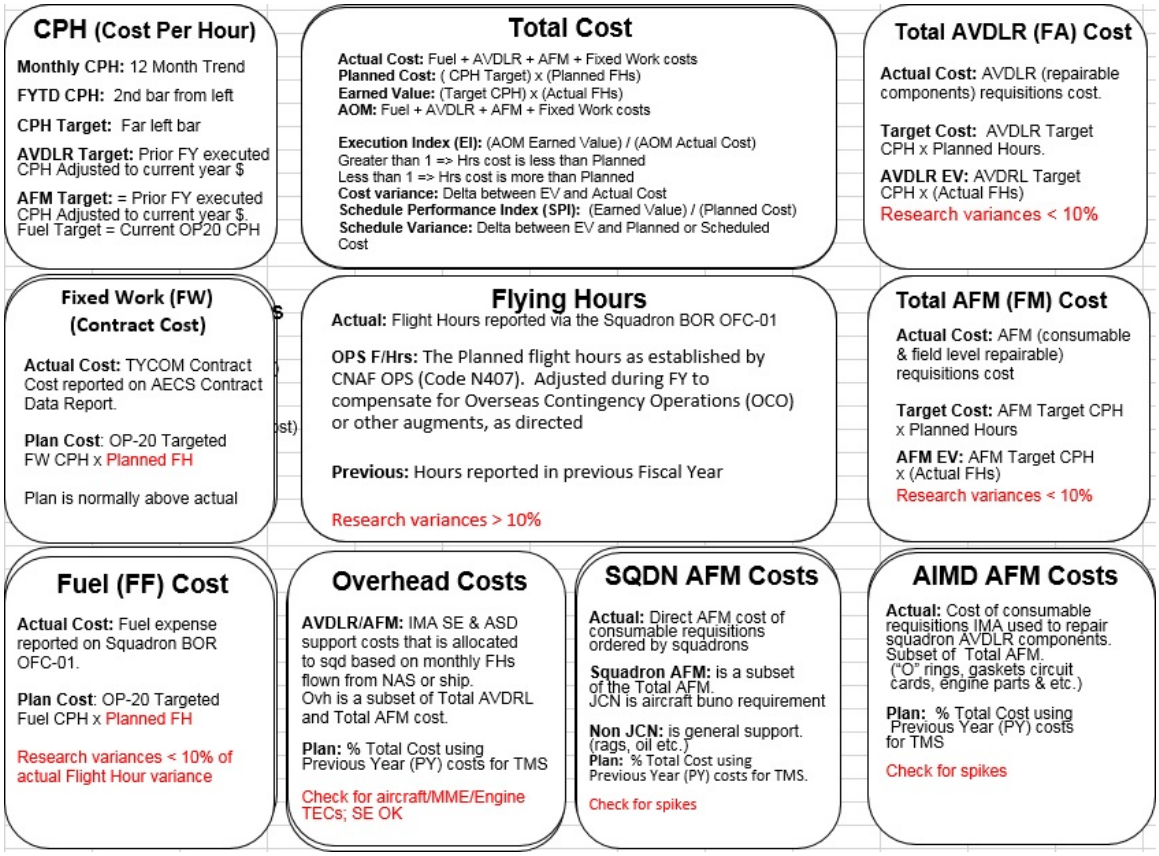
APPENDIX – GENERAL INFORMATION

This appendix contains information that applied to both NAS Key West and NAS Whidbey Island. This information was combined with data at the site-specific locations to generate our COA breakdowns for the individual NAS sites.

Table 7. Flight Cost Definitions. Source: Aviation Maintenance Duty Officer, email from NAS Whidbey Island, January 29, 2019



Parameters which define maintenance and fuel data pertaining to Cockpit Charts received from NAS maintenance teams.

Table 8. Facility Costs Per Year. Adapted from Jeffrey Miller, Email to author, January 23, 2019.

Cost to sustain Hangar 11, Whidbey Island, WA	
Service	**Cost**
SAR	$77,613
VAQ 209	$119,660
Total Cost	$197,273
Facility Cost Per month (SAR)	$6,468
Facility Cost Per day (SAR)	$215.59
Facility Cost Per hour (SAR)	$8.98

Facility Costs include utilities, facility maintenance, and building services.

Costs were based on average per year.

As we were unable to obtain data regarding facility costs for NAS Key West, it was assumed that costs would be relatively equal across both sites; therefore, Whidbey Island data was applied to both locations.

The following was a RAND study conducted in 2005, which encompassed fully burdened costs of a single service member on active duty paid by the DoD (Dahlman, 2007). Each item was inflated to reflect the 2018 value of our research. We used an inflation rate of 21.22 percent to convert these values. Our rate was derived from the consumer price index calculator (Bureau of Labor Statistics, n.d.). This data is encompassed in Tables 9, 10, & 11 inclusive.

Table 9. RAND Study – Cost of a Military Person. Adapted from Dahlman, 2007

Current compensation costs		Cost Per Work-		
Cash	2005	Year	2018	
Basic Pay	$42,001,244.00		$50,913,907.98	
Basic allowance for housing	$11,539,905.00		$13,988,672.84	
Basic allowance for subsistence	$2,994,794.00		$3,630,289.29	
Special and incentive pays	$3,417,392.00		$4,142,562.58	
Allowances	$2,064,392.00		$2,502,455.98	
Other pays and allowances	$26,984.00		$32,710.00	
Social Security tax	$3,191,640.00		$3,868,906.01	
Income tax tenefits (Dept of Treasury)	$2,407,441.00		$2,918,299.98	
Subtotal	$67,643,792.00	$47,840.00	$81,997,804.66	$57,991.65
In-kind benefits	2005		2018	
Health care, current dependents	$5,121,293.00		$6,208,031.37	
Family housing	$4,345,365.00		$5,267,451.45	
Personal travel	$1,701,701.00		$2,062,801.95	
Subsitence in-kind	$1,312,494.00		$1,591,005.23	
Child education (Dept of Education)	$437,219.00		$529,996.87	
Education assistance, current	$636,284.00		$771,303.46	
Discount groceries, current	$366,279.00		$444,003.40	
Child development	$684,272.00		$829,474.52	
Family support services	$186,900.00		$226,560.18	
Transportation subsidy	$18,844.00		$22,842.70	
Subtotal	$14,810,651.00		$17,953,471.14	
Total current compensation costs	$82,454,443.00	$58,315.00	$99,951,275.80	$70,689.44

In order to encompass the full costs of all benefits of a military member, RAND created line items and assigned values to best show full costs paid.

A total for fully burdened costs was derived by taking these line items minus the base pay, as our team derived base pay at the SAR stations according to their manning documents provided.

Table 10. RAND Study – Cost of a Military Person. Adapted from Dahlman, 2007

Deferred compensation costs		Cost Per Work-		Cost Per Work-
Cash	2005	Year	2018	Year
Retired pay accrual	$11,545,160.00		$13,995,042.95	
Separation pay	$828,378.00		$1,004,159.81	
Special compensation for disabled	$0.00		$0.00	
Unemployment benefits	$241,798.00		$293,107.54	
Death gratuities	$13,985.00		$16,952.62	
Survivor benefits	$10,295.00		$12,479.60	
Veterans' benefits, cash (Dept of VA)	$32,422,146.00		$39,302,125.38	
Concurrent receipt (Dept of Treasury)	$1,477,226.00		$1,790,693.36	
Subtotal	$46,538,988.00		$56,414,561.25	
In-kind benefits	2005		2018	
Health care, deferred	$9,062,646.00		$10,985,739.48	
Defense Health Plan (DHP) accrual	$7,442,940.00		$9,022,331.87	
Discount groceries, deferred	$470,802.00		$570,706.18	
Separation travel	$456,910.00		$553,866.30	
Education assistance, deferred	$17,276.00		$20,941.97	
Veterans' benefits, in-kind (Dept of VA)	$31,634,652.00		$38,347,525.15	
Employment training (Dept of Labor)	$222,833.00		$270,118.16	
Subtotal	$49,308,059.00		$59,771,229.12	
Total deferred compensation costs	$95,847,047.00		$116,185,790.37	
Total compensation costs	$178,301,490.00	$126,101.00	$216,137,066.18	$152,859.63

In order to encompass the full costs of all benefits of a military member, RAND created line items and assigned values to best show full costs paid.

A total for fully burdened costs was derived by taking these line items minus the base pay, as our team derived base pay at the SAR stations according to their manning documents provided.

Table 11. RAND Study – Cost of a Military Person. Adapted from Dahlman, 2007

Non-compensation costs	2005	Cost Per Work-Year	2018	Cost Per Work-Year
Health care, current military personnel	$4,214,822.00		$5,109,207.23	
Training (including cadets and ROTC)	$4,446,398.00		$5,389,923.66	
Base operations support (BOS),			$2,754,869.96	
facilities and support for training	$2,272,620.00		$0.00	
Child education	$1,515,367.00		$1,836,927.88	
Operational travel	$893,103.00		$1,082,619.46	
Recruitment, advertising, etc	$1,135,527.00		$1,376,485.83	
Manpower management	$728,111.00		$882,616.15	
Other personnel support	$548,427.00		$664,803.21	
Other costs	$6,111.00		$7,407.75	
Total non-compensation costs	$15,760,486.00	$67,787.00	$19,104,861.13	$82,171.40
Total current personnel costs	$194,061,976.00	$137,248.00	$235,241,927.31	$166,372.03
Average work-years	1,413,953		1,413,953	
Potential savings	$137,248.00		$166,372.03	
Savings minus already calculated cash (Per year per person)			$108,380.38	
CPI Inflation % (from 2005-2018)	21.22%			

In order to encompass the full costs of all benefits of a military member, RAND created line items and assigned values to best show full costs paid.

A total for fully burdened costs was derived by taking these line items minus the base pay, as our team derived base pay at the SAR stations according to their manning documents provided.

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APPENDIX – WHIDBEY ISLAND

This appendix contains all relevant background and supplemental information that was used to generate our COA breakdown for Whidbey Island located in Table 4.

Table 12. Whidbey Island Dashboard

Base Year	2018
Number of Aircraft	2
Hours Flown Per Year	960
Cost of Fuel per Gallon	$3.10
Enlisted Personnel	30
Officer Personnel	10
Fully Burdened Cost Per Person	$108,380.38
Facility Costs	$77,613
S-92 Burn Rate GPH	205
Bell 214 B Burn Rate GPH	160

This table is a snapshot of significant values used in our calculations for Whidbey Island. These calculations represent assumptions of values used throughout the model.

All values derived from subsequent tables presented below.

Table 13. Aircraft Costs for Whidbey Island

Aircraft Type/ Model/Series	Fiscal Year	Then Year Dollars	Count	Cost per Aircraft ($M)	
MH-60R	2013	$319,855,635	153	$2,090,559.71	
MH-60R	2014	$405,168,787	175	$2,315,250.21	
MH-60R	2015	$521,998,204	192	$2,718,740.65	
MH-60R	2016	$549,814,044	212	$2,593,462.47	
MH-60R	2017	$672,712,116	225	$2,989,831.63	
MH-60S	2013	$379,770,218	200	$1,898,851.09	
MH-60S	2014	$485,661,377	214	$2,269,445.69	
MH-60S	2015	$526,678,042	229	$2,299,904.11	
MH-60S	2016	$530,907,146	228	$2,328,540.11	
MH-60S	2017	$595,793,067	222	$2,683,752.55	
Aircraft					Inflated for 2018
MH-60R	2017	$672,712,116	225	$2,989,831.63	$3,050,857.94
MH-60S	2017	$595,793,067	222	$2,683,752.55	$2,738,530.83
S-92	2017	[redacted]		$17,700,000	$17,700,000.00
	SLEP'd	Not SLEP'd			
Aircraft Lifepsan hours	12,500	10,000			
	SLEP'd	Not SLEP'd			
Total Cost of Aircraft Per Hour	$244.07	$273.85			
Total Cost of Aircraft Per Year	$234,305.89	$262,898.96			
Total Cost of S-92 Per Hour	$1,416.00	$1,770.00			
Total Cost of S-92 Per Year	$1,359,360.00	$1,699,200.00			

MH-60 historical costs were a resource provided by our sponsor (N98) and detailed in Chapter V.

MH-60s' costs in 2017 were used as our base price and inflated to 2018 to normalize our data.

S-92 pricing for the year 2017 was derived from an aircraft broker and confirmed on their company website (Cox, n.d.). 2017 cost was inflated to match remaining calculations for 2018.

The term SLEP'd refers to the process of the Navy extending the useful lifespan of a particular aircraft platform. (Richard Holcomb, DCNO N9, personal communication, April 11, 2019) In this case, the intended lifespan of the MH-60 platform was estimated to last 10,000 hours, and then extended to 12,500.

SLEP'd costs were derived based on total cost of aircraft divided by the allotted SLEP'd hours. This number was then multiplied by the number of hours flown per year (found on Table 2).

Table 14. Active Duty Personnel Costs for Whidbey Island. Adapted from DFAS, 2019 and Military Benefits, 2017

Rank	#	*Average Pay	Total Pay Expense	Total Base Pay, BAH, COLA, BAS	Total Pay Personnel Pay Expenses
O6	0	$10,380.83	$0.00	$0.00	$0.00
O5	0	$8,769.80	$0.00	$0.00	$0.00
O4	3	$7,461.69	$22,385.06	$6,977.67	$29,362.73
O3	6	$5,918.85	$35,513.10	$12,347.34	$47,860.44
O2	1	$4,387.05	$4,387.05	$1,760.39	$6,147.44
O1	0	$3,171.30	$0.00	$0.00	$0.00
E9	0	$6,211.85	$0.00	$0.00	$0.00
E8	2	$5,360.10	$10,720.20	$4,110.78	$14,830.98
E7	2	$4,524.36	$9,048.72	$3,854.78	$12,903.50
E6	11	$3,744.75	$41,192.25	$19,930.79	$61,123.04
E5	13	$3,163.05	$41,119.65	$21,461.57	$62,581.22
E4	2	$2,485.80	$4,971.60	$3,116.78	$8,088.38
E3	0	$2,114.55	$0.00	$0.00	$0.00
E2	0	$0.00	$0.00	$0.00	$0.00
Total Active Duty Personnel	40				
Total Enlisted Personnel	30				
Total Personnel Pay Expense Per Year	$2,914,772.73				

Using the FY18 base pay scale, all amounts were derived by taking an average for each rate/rank based on the minimum and maximum TIS for that rank.

Column "#" delineates number of personnel of that rank assigned to NAS Key West.

Table 15. Active Duty Personnel Cost COA 1 for Whidbey Island. Adapted from DFAS, 2019 and Military Benefits, 2017

Rank	#	*Average Pay	Total Pay Expense	Total Base Pay, BAH, COLA, BAS	Total Pay Personnel Pay Expenses
O6	0	$10,380.83	$0.00	$0.00	$0.00
O5	0	$8,769.80	$0.00	$0.00	$0.00
O4	3	$7,461.69	$22,385.06	$6,977.67	$29,362.73
O3	6	$5,918.85	$35,513.10	$12,347.34	$47,860.44
O2	1	$4,387.05	$4,387.05	$1,760.39	$6,147.44
O1	0	$3,171.30	$0.00	$0.00	$0.00
E9	0	$6,211.85	$0.00	$0.00	$0.00
E8	1	$5,360.10	$5,360.10	$2,055.39	$7,415.49
E7	0	$4,524.36	$0.00	$0.00	$0.00
E6	6	$3,744.75	$22,468.50	$10,871.34	$33,339.84
E5	6	$3,163.05	$18,978.30	$9,905.34	$28,883.64
E4	2	$2,485.80	$4,971.60	$3,116.78	$8,088.38
E3	0	$2,114.55	$0.00	$0.00	$0.00
E2	0	$0.00	$0.00	$0.00	$0.00
Total Active Duty Personnel	25				
Total Enlisted Personnel	15				
Total Personnel Pay Expense Per Year	$1,933,175.49				

Using the FY18 base pay scale, all amounts were derived by taking an average for each rate/rank based on the minimum and maximum TIS for that rank.

Column "#" delineates number of personnel of that rank assigned to NAS Key West.

All maintenance and non-aircrew rates were removed as these jobs would potentially be covered by the CFT maintenance team (U.S. Navy, 2019).

Table 16. NAS Lemoore Maintenance Contract. Source: NAS Contract Manager, email from NAS Fallon SAR, May 5, 2019.

BSO 70	**Lemoore SAR**
Contract #	**18-F-0027**
PoP Begin	**01-Mar-18**
PoP End	**28-Feb-19**
Current Contract Total Cost	**$4,130,380.80**
Base Year	**$4,130,380.80**
Base Year Months	**12**
Base Year Cost/Month/FTE	**$ 6,258.15**
Base Year FTE	**55**
Average Monthly Cost/FTE	**$6,258.15**
Projected Monthly Cost/FTE (+3%)	**$6,445.90**
Projected Base Year (12 mths)	**$ 4,254,292.22**
Option Year 1	**$ 4,381,920.99**
Option Year 2	**$ 4,513,378.62**
Option Year 3	**$ 4,648,779.98**
Option Year 4	**$ 4,788,243.38**

Permission to share general contract information granted, email from source, May 21, 2019.

NAS Lemoore data used to calculate CFT for Whidbey Island as outlined in Chapter V – Maintenance.

Projected cost includes FFP, NWD, CBA, and transition fees, and is based on either:

a. the average monthly cost per FTE over the life of the contract if the contract pricing is unbalanced

b. the average monthly cost per FTE for the last period of performance if the contract pricing is balanced.

3 percent COLA increase per year added to contract cost

3 percent Transition Fee

This chart does not include reimbursable or management fees.

Table 17. Flight Costs Whidbey Island. Adapted from Whidbey SAR, email from Aviation Maintenance Duty Officer, January 16, 2019.

FY16 Totals								
HOURS	AVDLR CPH	TOTAL AVDLR	AFM CPH	TOTAL AFM	FUEL CPH	TOTAL FUEL	TOTAL	TOTAL CPH
861.8	$1,515.11	$1,305,718.22	$819.45	$706,197.99	$319.83	$275,625.39	$2,287,541.60	$2,654.38
Fuel CPH	$319.83							
AVDLR/AFN CPH	$2,334.55							
Annual Avg Fuel CPG	$2.69							
FY 17 Totals								
HOURS	AVDLR CPH	TOTAL AVDLR	AFM CPH	TOTAL AFM	FUEL CPH	TOTAL FUEL	TOTAL	TOTAL CPH
915.9	$2,152.19	$1,971,189.39	$761.00	$696,996.86	$302.93	$277,453.82	$2,945,640.07	$3,216.12
Fuel CPH	$302.93							
AVDLR/AFM CPH	$2,913.19							
Annual Avg Fuel CPG	$3.02							
FY 18 Totals								
HOURS	AVDLR CPH	TOTAL AVDLR	AFM CPH	TOTAL AFM	FUEL CPH	TOTAL FUEL	TOTAL	TOTAL CPH
960	$2,102.60	$2,018,497.93	$743.46	$713,724.79	$310.20	$297,792.56	$3,030,015.28	$3,156.27
FY 18 Figures								
Fuel CPH	$310.20							
AVDLR/AFM CPH	$2,983.10							
Fuel CPG	$3.10							
AVDLR/AFM CPY	$2,863,777.50							
Inflation Rate Used	2.40%							

Data derived from source named in table title.

Fuel totals were based upon consumption, then multiplied by the total flight hours flown.

AVLDR and AFM totals were combined to derive a fully burdened maintenance cost for the NAS.

An inflation rate of 2.4 percent was used from the CPI to attain values for the FY18 year.

Table 18. Civilian Maintenance Costs. Adapted from Defense Civilian Personnel Advisory Service, 2017 and OPM, 2019

Civilians					
PI PY	**Pay Grade**	**Number Of Personnel**	**Hourly Pay**	**Weekly Pay**	**Yearly Pay**
WG	10	3	$92.39	$3,695.76	$192,179.52
	9	1	$29.79	$1,191.76	$61,971.52
	8	5	$142.74	$5,709.60	$296,899.20
WS	10	2	$30.80	$1,231.92	$64,059.84
WL	10	1	$30.80	$1,231.92	$64,059.84
WD	7	1	$39.06	$1,562.40	$81,244.80
GS	7	1			$41,231.50
	Total	14			$801,646.22

All pay amounts have been determined by average pay in that pay grade since "steps" and time in position were unknown and will change with turnover

Weekly Pay based on assumed 40 standard work week

Yearly Pay is weekly pay multiplied by 52 weeks

GS Pay is based on an annual salary

Table 19. Estimated Yearly Contracting SAR Costs for Whidbey Island

***Based on BY18 Numbers**					
Category	Contracting Costs (Based on two aircraft at site)	NAS Whidbey Island Requirements	Yearly Contracting Costs		
Variable Cost	$1,968	960	$1,889,280		
Fixed Cost (Aircraft)	$958,905	2	$1,917,810		
Subtotal			$3,807,090		
Travel (Assumed)	$50,000	1	$50,000		
Materials/Shipping (Assumed)	$20,000	1	$20,000		
Program Management	$10.8M * 10%	270000	$270,000		
Overhead	($10.8M + $1.1M) * 20%	595000	$595,000		
G&A (Incl. Travel/Materials)	($10.8M + $1.1M + $2.4M + $0.3M) * 15%	547500	$547,500		
Profit	($10.8M + $1.1M + $2.4M + $2.2M) * 15%	618750	$618,750		
Contractor Total Per Year			$5,908,340		
Fixed Costs			# Required	Per aircraft	Per two aircraft
Pilots	$138,690.00	per person	4	$554,760.00	$1,109,520.00
EMT	$36,700.00	per person	2	$73,400.00	$146,800.00
Maintenance Labor	$62,540.00	per person	4	$250,160.00	$500,320.00
Training	$6,000.00	per crew member	6	$36,000.00	$72,000.00
Insurance	$31,400.00	Flat rate	1	$31,400.00	$62,800.00
Aircraft Modernization	$51,094.00	Flat rate	1	$51,094.00	$102,188.00
SW, Charts, Weather Service	$4,791.00	Flat rate	1	$4,791.00	$9,582.00
			Total	$1,001,605.00	$2,003,210.00
Variable Costs					
Fuel	$495.37	per flight hour	960	$475,550.43	
Consumables (Maintenance)	$889.00	per flight hour	960	$853,440.00	
Depreciation	$468.00	per flight hour	960	$449,280.00	
Aircraft Market Rate	$611.00	per flight hour	960	$586,560.00	
			Total w/ fuel	$2,364,830.43	
			Total w/o fuel	$1,889,280.00	
Bell214 Gal/Hr	160				

Flight hours based on quarterly average 240 flight hours (240*4=960 hours yearly)

Contract costs were broken down into fixed costs based upon the number of personnel needed to conduct operations and variable costs based upon the number of flight hours flown.

A burn rate of 160 gallons per minute was calculated for the Bell 214B and used in determining fuel costs.

Personnel costs were based upon manning for two aircraft per NAS.

APPENDIX – KEY WEST

This appendix contains all relevant background and supplemental information that was used to generate our COA breakdown for Key West located in Table 6.

Table 20. Key West Dashboard

Base Year	2018
Aircraft Type	MH-60R
Number of Aircraft	2
Hours Flown Per Year	864
Cost of Fuel per Gallon	$2.06
Enlisted Personnel	37
Officer Personnel	11
Fully Burdened Costs Per Person	$108,380.38
Facility Cost	$77,613
S-92 Burn Rate GPH	205
Bell 214B Burn Rate GPH	160

This table is a snapshot of significant values used in our calculations for Key West. These calculations represent assumptions of values used throughout the model.

All values derived from subsequent tables presented below.

Table 21. Aircraft Costs for Key West

Aircraft Type/ Model/Series	Fiscal Year	Then Year Dollars	Count	Cost per Aircraft ($M)	
MH-60R	2013	$319,855,635	153	$2,090,559.71	
MH-60R	2014	$405,168,787	175	$2,315,250.21	
MH-60R	2015	$521,998,204	192	$2,718,740.65	
MH-60R	2016	$549,814,044	212	$2,593,462.47	
MH-60R	2017	$672,712,116	225	$2,989,831.63	
MH-60S	2013	$379,770,218	200	$1,898,851.09	
MH-60S	2014	$485,661,377	214	$2,269,445.69	
MH-60S	2015	$526,678,042	229	$2,299,904.11	
MH-60S	2016	$530,907,146	228	$2,328,540.11	
MH-60S	2017	$595,793,067	222	$2,683,752.55	
Aircraft					Inflated for 2018
MH-60R	2017	$672,712,116	225	$2,989,831.63	$3,050,857.94
MH-60S	2017	$595,793,067	222	$2,683,752.55	$2,738,530.83
S-92	2017	[redacted]		$17,700,000	$17,700,000
	SLEP'd	Not SLEP'd			
Aircraft Lifepsan hours	12,500	10,000			
	SLEP'd	Not SLEP'd			
Total Cost of MH-60R Per Hour	$244.07	$273.85			
Total Cost of MH-60R Per Year	$210,875.30	$236,609.06			
Total Cost of S-92 Per Hour	$1,416.00	$1,770.00			
Total Cost of S-92 Per Year	$1,223,424.00	$1,529,280.00			

MH-60 historical costs were a resource provided by our sponsor (N98) and detailed in Chapter V.

MH-60s' costs in 2017 were used as our base price and inflated to 2018 to normalize our data.

S-92 pricing for the year 2017 was derived from an aircraft broker and confirmed on their company website (Cox, n.d.). 2017 cost was inflated to match remaining calculations for 2018.

The term SLEP'd refers to the process of the Navy extending the useful lifespan of a particular aircraft platform. (Richard Holcomb, DCNO N9, personal communication, April 11, 2019) In this case, the intended lifespan of the MH-60 platform was estimated to last 10,000 hours, and then extended to 12,500.

SLEP'd costs were derived based on total cost of aircraft divided by the allotted SLEP'd hours. This number was then multiplied by the number of hours flown per year (found on Table 3).

Table 22. Active Duty Personnel Costs for Key West. Adapted from DFAS (2019) and Military Benefits (2017).

Rank	#	*Average Pay	Total Pay Expense	Total Base Pay, BAH, COLA, BAS	Total Pay Personnel Pay Expenses
O6	0	$10,380.83	$0.00	$0.00	$0.00
O5	1	$8,769.80	$8,769.80	$3,798.89	$12,568.69
O4	2	$7,461.69	$14,923.37	$7,333.78	$22,257.15
O3	8	$5,918.85	$47,350.80	$27,295.12	$74,645.92
O2	0	$4,387.05	$0.00	$0.00	$0.00
O1	0	$3,171.30	$0.00	$0.00	$0.00
E9	0	$6,211.85	$0.00	$0.00	$0.00
E8	1	$5,360.10	$5,360.10	$3,427.89	$8,787.99
E7	1	$4,524.36	$4,524.36	$3,319.89	$7,844.25
E6	6	$3,744.75	$22,468.50	$19,496.34	$41,964.84
E5	18	$3,163.05	$56,934.90	$53,656.02	$110,590.92
E4	11	$2,485.80	$27,343.80	$30,578.79	$57,922.59
E3	0	$2,114.55	$0.00	$0.00	$0.00
E2	0	$0.00	$0.00	$0.00	$0.00
Total Active Duty Personnel	48				
Total Enlisted Personnel	37				
Total Personnel Pay Expense Per Year	$4,038,988.22				

Using the FY18 base pay scale, all amounts were derived by taking an average for each rate/rank based on the minimum and maximum TIS for that rank.

Column "#" delineates number of personnel of that rank assigned to NAS Key West.

Table 23. Active Duty Personnel Cost COA 1. Adapted from DFAS, (2019) and Military Benefits (2017).

Rank	#	*Average Pay	Total Pay Expense	Total Base Pay, BAH, COLA, BAS	Total Pay Personnel Pay Expenses
O6	0	$10,380.83	$0.00	$0.00	$0.00
O5	1	$8,769.80	$8,769.80	$3,798.89	$12,568.69
O4	2	$7,461.69	$14,923.37	$7,333.78	$22,257.15
O3	8	$5,918.85	$47,350.80	$27,295.12	$74,645.92
O2	0	$4,387.05	$0.00	$0.00	$0.00
O1	0	$3,171.30	$0.00	$0.00	$0.00
E9	0	$6,211.85	$0.00	$0.00	$0.00
E8	0	$5,360.10	$0.00	$0.00	$0.00
E7	0	$4,524.36	$0.00	$0.00	$0.00
E6	1	$3,744.75	$3,744.75	$3,249.39	$6,994.14
E5	9	$3,163.05	$28,467.45	$26,828.01	$55,295.46
E4	3	$2,485.80	$7,457.40	$8,339.67	$15,797.07
E3	0	$2,114.55	$0.00	$0.00	$0.00
E2	0	$0.00	$0.00	$0.00	$0.00
Total Active Duty Personnel	24				
Total Enlisted Personnel	13				
Total Personnel Pay Expense Per Year	$2,250,701.18				

Using the FY18 base pay scale, all amounts were derived by taking an average for each rate/rank based on the minimum and maximum TIS for that rank.

Column "#" delineates number of personnel of that rank assigned to NAS Key West.

All maintenance and non-aircrew rates were removed as these jobs would potentially be covered by the CFT maintenance team (U.S. Navy, 2019).

Table 24. NAS Fallon Maintenance Contract. Source: NAS Contract Manager, email from NAS Fallon SAR, May 5, 2019.

BSO 70	**Fallon SAR**
Contract #	**FA8108-18-F-0014**
PoP Begin	**01-Jan-18**
PoP End	**31-Dec-18**
Current Contract Total Cost	**$ 3,288,537.60**
Base Year	**$ 3,288,537.60**
Base Year Months	**12**
Base Year Cost/Month/FTE	**$ 7,829.85**
Base Year FTE	**35**
Average Monthly Cost/FTE	**$7,829.85**
Projected Monthly Cost/FTE (+3%)	**$8,064.75**
Projected Base Year (12 mths)	**$ 3,387,193.73**
Option Year 1	**$ 3,488,809.54**
Option Year 2	**$ 3,593,473.83**
Option Year 3	**$ 3,701,278.04**
Option Year 4	**$ 3,812,316.38**

Permission to share general contract information granted, email from source, May 21, 2019.

NAS Fallon data used to calculate CFT for Key West as outlined in Chapter V – Maintenance.

Projected cost includes FFP, NWD, CBA, and transition fees, and is based on either:

c. the average monthly cost per FTE over the life of the contract if the contract pricing is unbalanced

d. the average monthly cost per FTE for the last period of performance if the contract pricing is balanced.

3 percent COLA increase per year added to contract cost

3 percent Transition Fee

This chart does not include reimbursable or management fees

Table 25. Flight Costs Key West. Source: CWO3 Watkins, Email from Key West Maintenance Officer, February 20, 2019.

FY17								
HOURS	AVDLR CPH	TOTAL AVDLR	AFM CPH	TOTAL AFM	FUEL CPH	TOTAL FUEL	TOTAL	TOTAL CPH
760	$2,459.01	$1,867,864.00	$802.92	$609,898.03	$331.44	$251,761.82	$2,729,523.85	$3,593.37
Fuel CPH	$331.44							
AVDLR/AFM CPH	$3,260.21							
Yearly Avg Fuel CPG	$2.29							
FY18								
HOURS	AVDLR CPH	TOTAL AVDLR	AFM CPH	TOTAL AFM	FUEL CPH	TOTAL FUEL	TOTAL	TOTAL CPH
760	$2,619.15	$1,989,506.34	$923.20	$701,262.72	$369.28	$280,505.09	$2,971,274.15	$3,911.63
Fuel CPH	$369.28							
Yearly Fuel Total	$319,057.92							
AVDLR/AFM CPH	$3,540.49							
Yearly AVDLR/AFM Total	$3,058,979.56							
Yearly Avg Fuel CPG	$2.06							

Data derived from source named in table title.

Fuel totals were based upon consumption, then multiplied by the total flight hours flown.

AVLDR and AFM totals were combined to derive a fully burdened maintenance cost for the NAS.

Table 26. Estimated Yearly Contracting SAR Costs for Key West

*Based on BY18 Numbers					
Category	Contracting Costs (Based on two aircraft at site)	NAS Key West Requirements	Yearly Contracting Costs		
Variable Cost	$2,316	864	$2,001,102		
Fixed Cost (Aircraft)	$958,905	2	$1,917,810		
Subtotal			$3,918,912		
Travel (Assumed)	$50,000	1	$50,000		
Materials/Shipping (Assumed)	$20,000	1	$20,000		
Program Management	$10.8M * 10%	270000	$270,000		
Overhead	($10.8M + $1.1M) * 20%	595000	$595,000		
G&A (Incl. Travel/Materials)	($10.8M + $1.1M + $2.4M + $0.3M) * 15%	547500	$547,500		
Profit	($10.8M + $1.1M + $2.4M + $2.2M) * 15%	618750	$618,750		
Contractor Total Per Year			$6,020,162		
Total Per Quarter			$2,006,720.59		
Total Per Month			$501,680.15		
Fixed Costs			Required	Per aircraft	Per two aircrafts
Pilots	$138,690.00	per person	4	$554,760.00	$1,109,520.00
EMT	$36,700.00	per person	2	$73,400.00	$146,800.00
Maintenance Labor	$62,540.00	per person	4	$250,160.00	$500,320.00
Training	$6,000.00	per crew member	6	$36,000.00	$72,000.00
Insurance	$31,400.00	Flat rate	1	$31,400.00	$62,800.00
Aircraft Modernization	$51,094.00	Flat rate	1	$51,094.00	$102,188.00
SW, Charts, Weather Service	$4,791.00	Flat rate	1	$4,791.00	$9,582.00
			Total	$1,001,605.00	$2,003,210.00
Variable Costs					
Fuel (Government Supplied)	$329.29	per flight hour	864	$284,506.07	
Consumables (Maintenance)	$889.00	per flight hour	864	$768,096.00	
Depreciation	$468.00	per flight hour	864	$404,352.00	
Aircraft Market Rate	$611.00	per flight hour	864	$527,904.00	
			Total	$1,984,858.07	
Bell214B Gallons Per Hour	160				

Flight hours based on average quarterly flight hours of 216 (216*4=864 hours yearly).

Contract costs were broken down into fixed costs based upon the number of personnel needed to conduct operations and variable costs based upon the number of flight hours flown.

A burn rate of 160 gallons per minute was calculated for the Bell 214B and used in determining fuel costs.

Personnel costs were based upon manning for two aircraft per NAS.

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